Car CD changer 22DC012

/00/35/60/60E/61/65/75

Service
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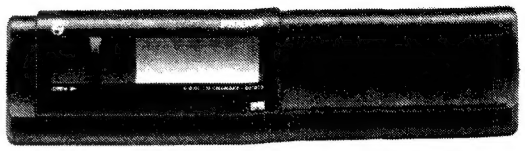

CAR 00096A

Service Manual

12 V

Contents **Page**

1.	Specification	1
2.	Connections	2
3.	Operation	2, 3
4.	Function description	4
5.	Time charts	5-8
6.	CD symptoms and failures	9
7.	Error diagnosis flow chart	9
8.	Magazine emergency eject	10
9.	Sensor status on errors	10, 11
10.	Disassembling	12, 13
11.	Checks and adjustments	14
12.	Block diagram	15
13.	Circuit diagram I	16
14.	Layout main PCB	17, 19
15.	Circuit diagram II	18
16.	Layout pcb's & wiring diagram	20
17.	Semiconductor blockdiagrams & lead layout	21-23
18.	List of electrical parts	23
19.	Exploded view CD mechanism I	24
20.	Exploded view CD mechanism II	25
21.	List of parts CD mechanism	25
22.	Exploded view set	26
23.	List of mechanical parts set	27

COMPACT disc DIGITAL AUDIO

CLASS 1
LASER PRODUCT

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Subject to modification 8222 725 24625

PCS 73 951

PHILIPS

1. Specification

System	: Optical (compact disc system)	Total harmonic distortion	: 0.03% (at 1kHz)
Number of quantization bits	: 16-bit linear system	Power supply	: 10.5-16.0V
Sampling rate	: 176.4kHz	Consumption (play)	: 1A
Oversampling	: 8 times	Output voltage	: 750mV/10k
D/A convectors	: 2x 20-bit	Access time (load magazine till play)	: max. 31s
Channels	: 2-channel stereo	Bus system	: D2B
Channel separation	: 85dB (at 1kHz)	Dimensions	: 283x75x193mm
Frequency response	: 5-20.000Hz (1.0dB)	Weight	: 2.5kg
S/N ratio :98dB			

2. Connections (Fig.1)

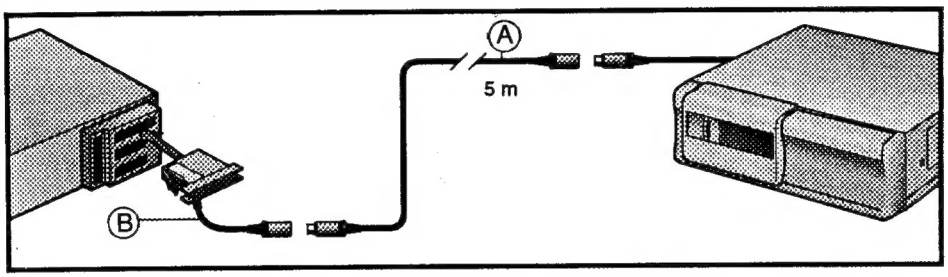


Fig. 1

3. Operation (Fig. 2)

Preparation for playback.

- Insert one or more CDs (max. 6) into the disc housing of the magazine with the label facing up.
- Insert the magazine all the way into the changer with the arrow facing up.
- Slide the door to the left to close the magazine compartment.

Removing a CD from the magazine.

- Push the lever on the magazine for the relevant CD. The CD will come out halfway from the magazine.
- Pull out the CD by the edge.

Note: Hold the CD so that no finger prints are left on the disc surface.

Removing the magazine.

- Slide the door to the right.
- Press the eject switch.

Notes:
- Do not insert heat-deformed CDs into the magazine.
- Only one CD can be inserted in each housing.
- To play a 3" disc, only use adapter ring SBC3580.
- Do not forcibly remove the magazine. Refer to "Magazine emergency eject", page 10
- Only Compact Discs with the logo shown below can be used.

PCS 73 952

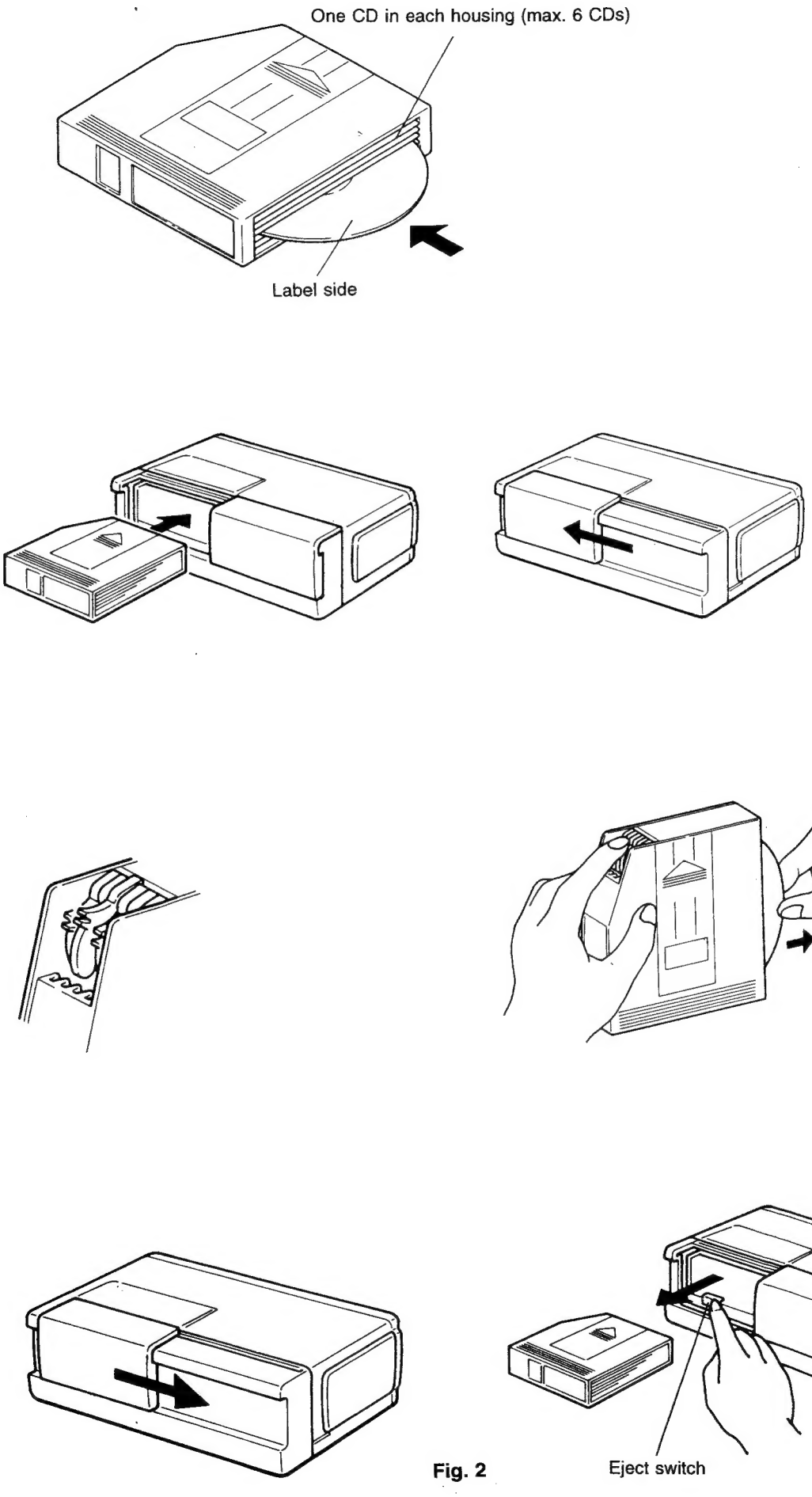


Fig. 2

PCS 73 953

22DC012/0022DC082/65

4. Function description

Function	Step	Description	Fig.
Magazine insertion	1)	The magazine transports the eject lever.	3
	2)	The eject lever drives the magazine lock arm.	
	3)	The magazine lock arm locks the magazin and operates the magazine lock switch.	
Disc loading	1)	The elevator motor rotates (NOR).	4
	2)	The rotation is transmitted to gears A, B, C, D, E.	
	3)	Gear E drives the CR chassis in direction F.	
	4)	The photo interruptor counts the holes H to control the level of the CR chassis.	
	5)	The CR chassis stops at the level of the chosen CD.	
	6)	The loading motor rotates (NOR).	5
	7)	The rotation is transmitted to gears I, K, L and via gear K also to gears J, M, N, O.	
	8)	The rotation of gear L drives the disc eject lever back and forth in direction P, Q.	
	9)	The disc eject lever ejects the CD from the magazine.	
	10)	The drive roller (same spindle as gear O) rotates.	6
	11)	Sandwiched between drive roller and free roller the CD moves towards the clamper.	
	12)	Photo sensors 1, 2, 3 are consecutively blocked by the CD and finally only sensor 3 is in blocked condition.	5
	13)	The loading motor stops upon judgement: CD entered.	
	14)	The elevator motor rotates REV.	4
	15)	The rotation is transmitted to gears A, B, C, D, E.	
	16)	The rotation of gear E drives the CR chassis in direction G.	
	17)	The CR chassis transports the clamper, which clamps the CD.	
	18)	The CR chassis drives the arm of the home position switch and operates the home position switch.	
	19)	The photo interruptor counts the holes H in gear C and the elevator motor stops at judgement: CR chassis in home position.	
Play	1)	The spindle motor rotates the CD.	7
	2)	The sled motor rotates.	
	3)	The rotation is transmitted through the gears to the feed screw and drives the pick-up unit.	
	4)	The lead-in position of the CD is detected by the inner limit position switch and the reading of the CD data starts.	

PCS 73 954

Function	Step	Description	Fig.
Return of the CD to the magazine	1)	The elevator motor rotates.	4
	2)	The rotation is transmitted to gears A, B, C, D, E.	
	3)	The rotation of gear E drives the CR chassis in direction F.	
	4)	The clamper is removed.	
	5)	The CD is sandwiched between drive roller and free roller.	
	6)	The photo interruptor counts the holes H to control the level of the CR chassis.	
	7)	The CR chassis stops at the level of the chosen disc.	
	8)	The loading motor rotates.	8
	9)	The rotation is transmitted to gears I, J, K, M, N, O.	
	10)	The drive roller (same spindle as gear O) rotates and drives the CD towards the magazine.	5
	11)	Blocking of photo sensor 3 is cancelled.	
	12)	Photo sensors 2 and 1 are consecutively blocked by the CD and the blocking is cancelled again.	
	13)	The loading motor stops upon judgement: CD in magazine.	
Magazine ejection	1)	The eject button operates the eject switch.	9
	2)	The elevator motor rotates.	4
	3)	The rotation is transmitted to gears A, B ,C, D, E.	
	4)	Gear E drives the CR chassis in direction G.	
	5)	The CR chassis drives the arm of the home position switch and operates the home position switch.	
	6)	The photo interruptor counts the holes H and the elevator motor stops at judgement: CR chassis in home position.	
	7)	The loading motor rotates.	5
	8)	The rotation is transmitted to gears J, K, L.	
	9)	The rotation of gear L drives the disc eject lever back and forth in direction P, Q.	
	10)	The disc eject lever drives the eject arm.	9
	11)	The eject arm drives the eject lever, the magazine lock arm is released and the magazine is ejected.	
	12)	The magazine lock switch is switched off and judgement is given: magazine ejected.	

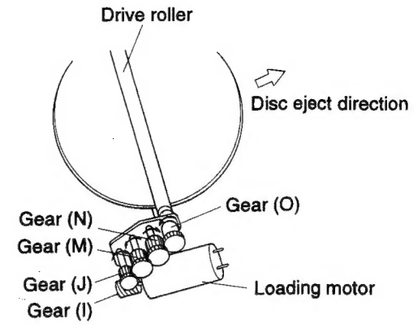


Fig. 8

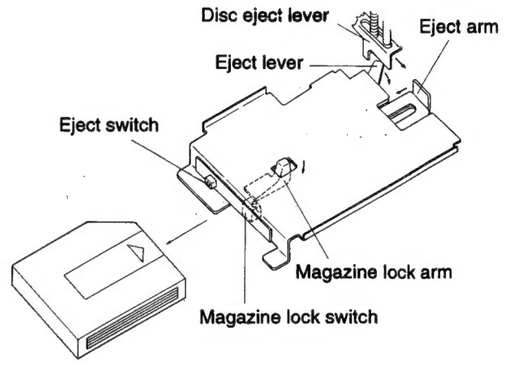


Fig. 9

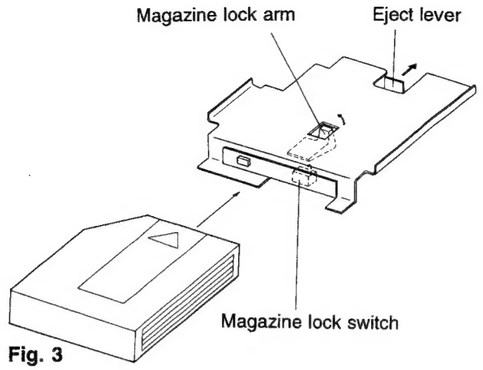


Fig. 3

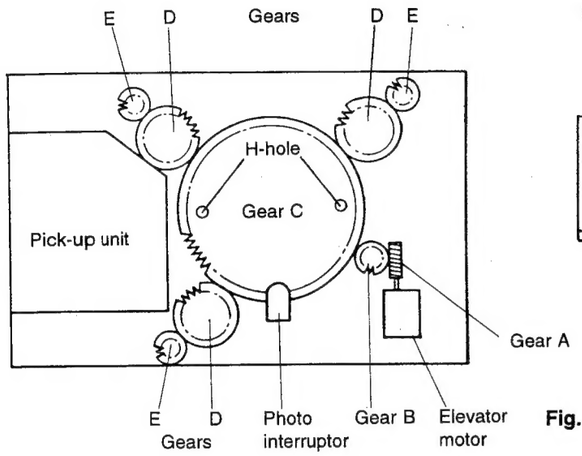
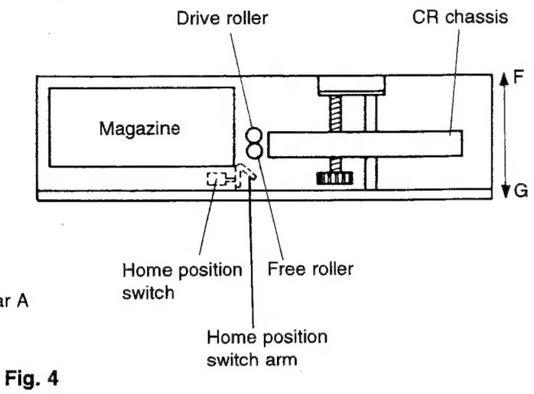
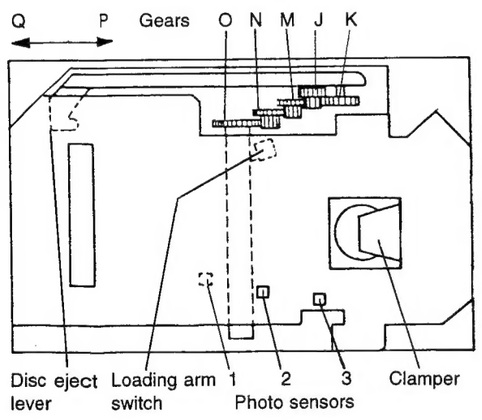


Fig. 4





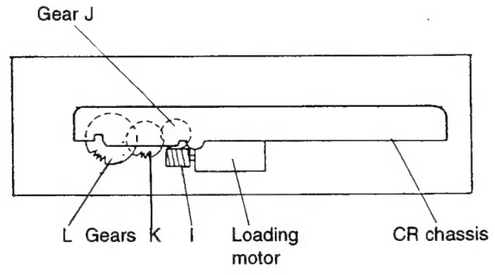


Fig. 5

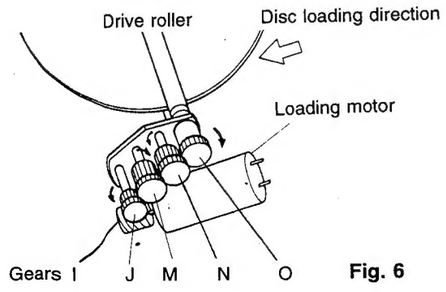


Fig. 6

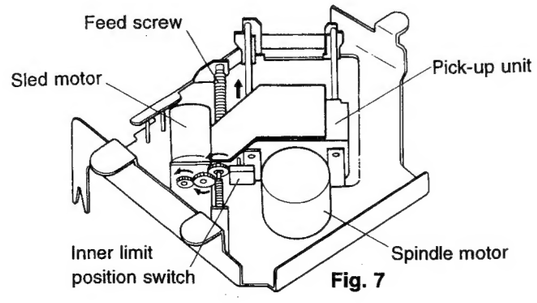
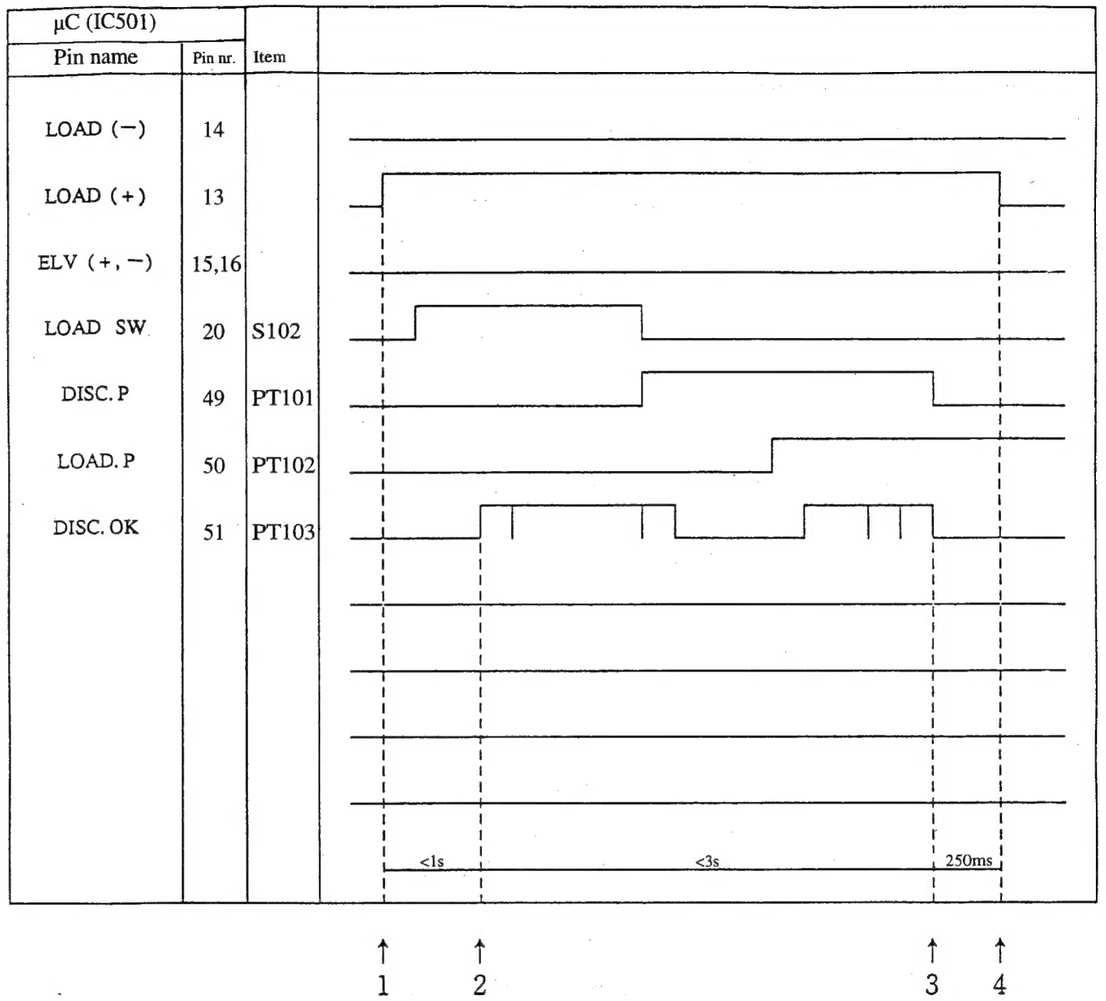


Fig. 7

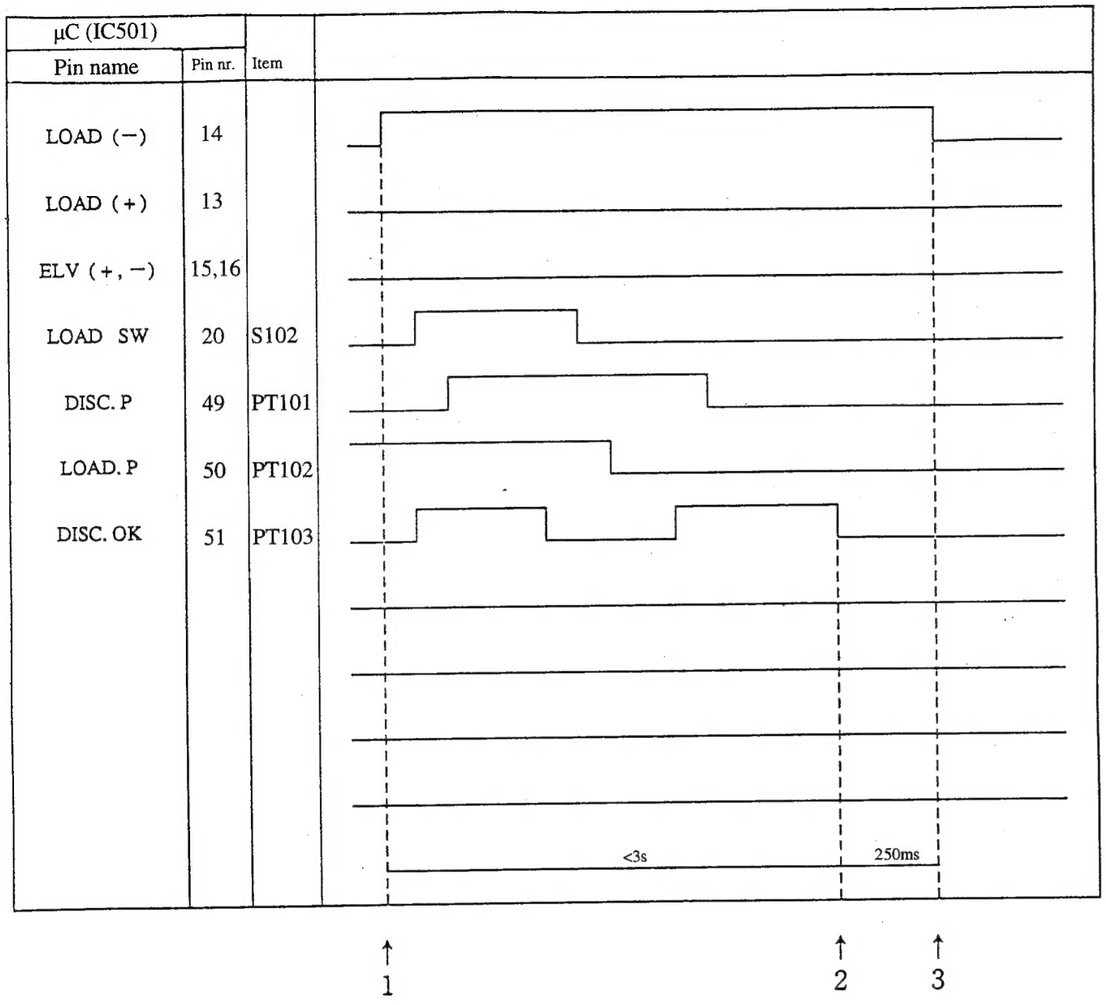
5.1 Disc loading (with CD).



SEQUENCE

1	Pin 16: loading motor activation (forward direction).
2	Disc ejected from the magazine and detected by PI101 within 1s (DISC OK = "H").
3	µC conditions change after 3s: pin 51 = "L", pin 49 = "L", pin 50 = "H", pin 20 = "L".
*	If conditions are not met within 3s, the disc will be unloaded.
4	After sequence 3 is completed, the µC waits for 250ms, then pin 13 gets "L".

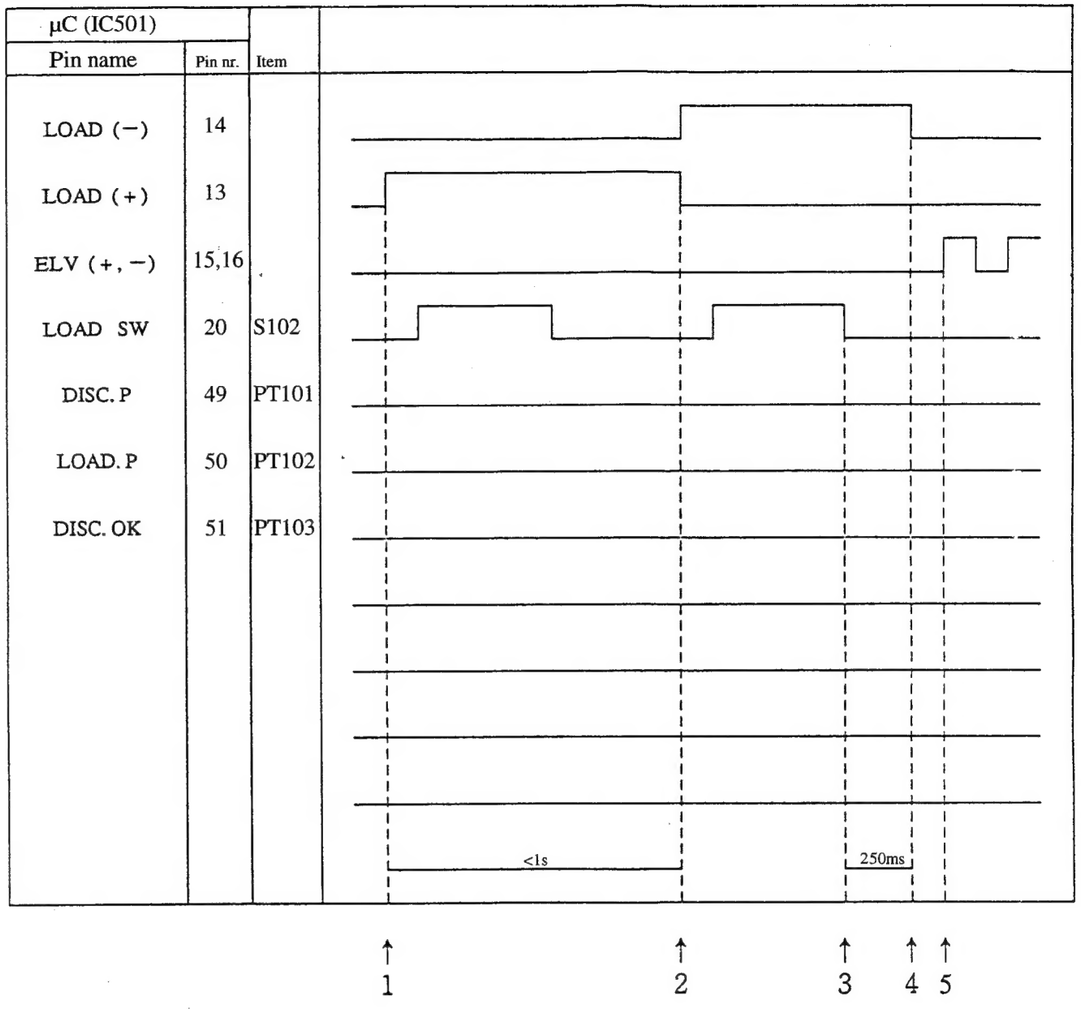
5.2 Disc unloading.



SEQUENCE

1	Pin 14 = "H": loading motor activation (reverse direction).
2	µC conditions change after 3s: pin 51 = "L", pin 49 = "L", pin 50 = "L", pin 20 = "L".
*	If condition is not met within 3s, the disc will reload and the sequence will be repeated.
3	After sequence 2 is completed, the µC waits for 250ms, then pin 14 gets "L".
*	After 3 unsuccessful attempts, the display shows "ERROR". The elevator moves to "home position".
*	Unloading process complete: pin 50 = "L", pin 49 = "L", pin 51 = "L", pin 20 = "L".

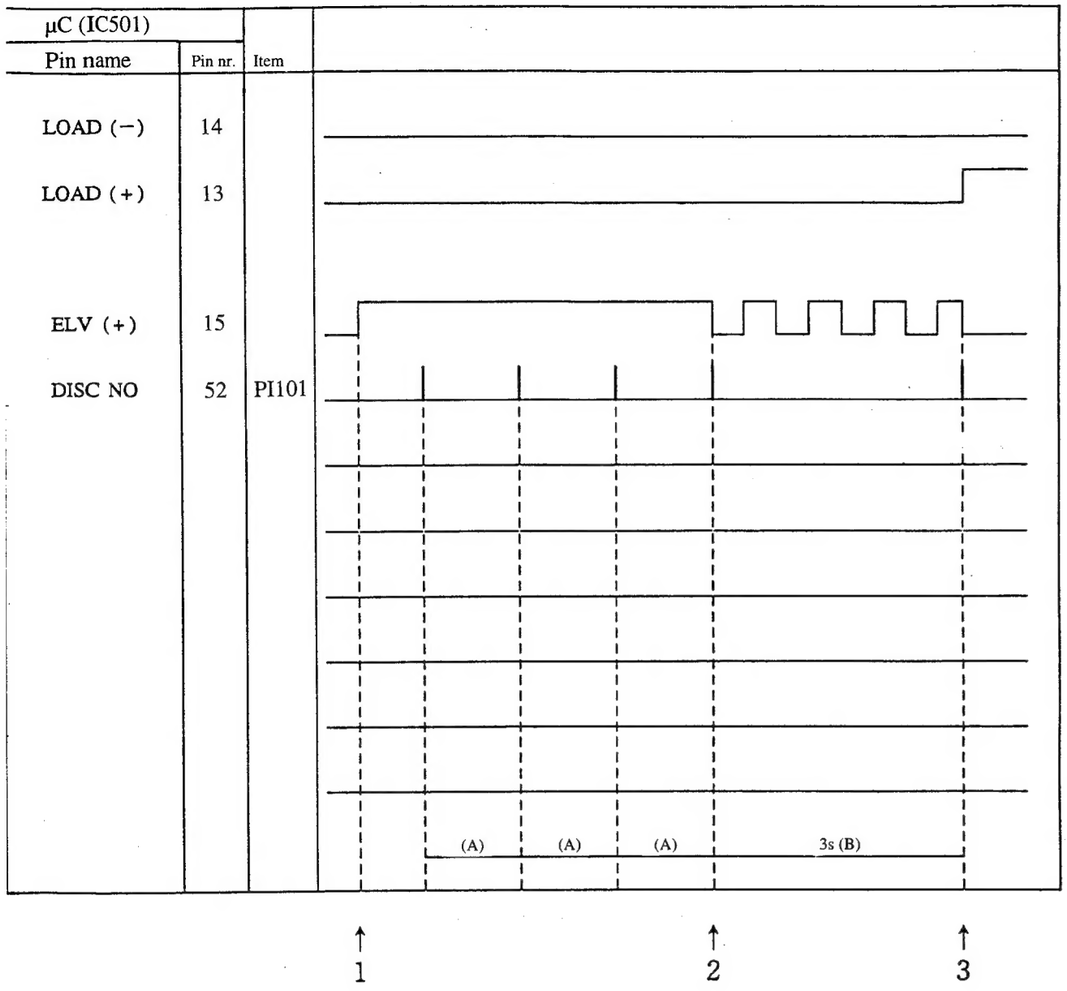
5.3 Disc loading (without CD).



SEQUENCE

1	Pin 16 = "H": loading motor activation (forward direction).
2	The µC waits for 1s to meet the conditions: pin 49 = "H", pin 50 = "H", pin 51 = "H".
*	If conditions are not met, the µC judges a "no disc" condition and the unloading cycle is activated. Pin 14 gets "H", pin 13 gets "L".
3	When pin 14 is "H" the µC waits for 250ms, then pin 14 gets "L". This completes the loading cycle.
4	The elevator moves to the next disc housing in the magazine. During this sequence the µC applies a steady pulse to pin 14 or 15.

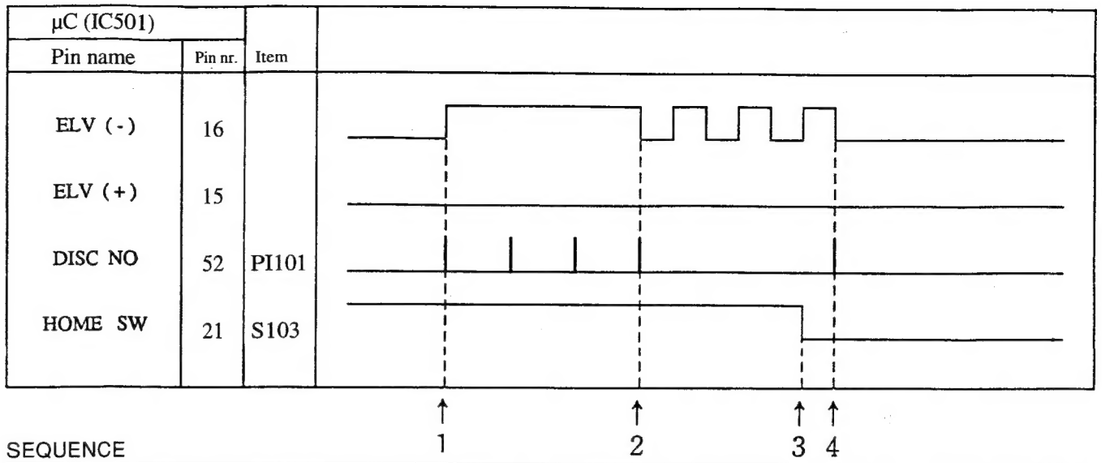
5.4 Disc change.



SEQUENCE

1	Pin 14 or 13 is held "L" (depending on the direction of the elevator) until the elevator is at the housing position of the target CD.
2	When the elevator has reached the proper position, a pulse is applied to pin 15 or 16.
3	When the elevator has reached the proper position, pin 15 or pin 16 gets "L".
*	If no signal for 1s from disc sensor the display will show "ERROR".
*	If no signal for 3s from disc sensor the display will show "ERROR".

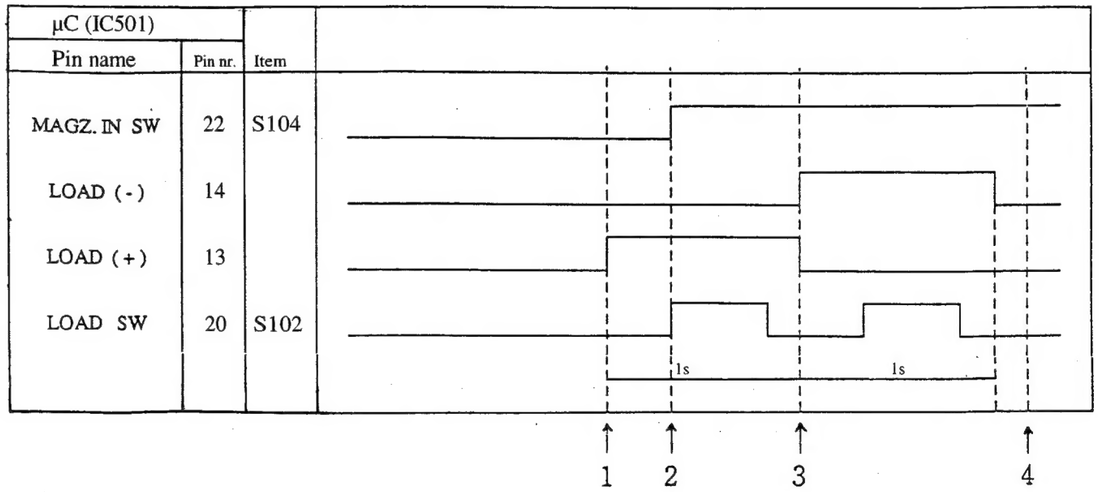
5.5 Return to home position.



SEQUENCE

Home position	This is the rest position for the elevator mechanism before the play mode starts and during the eject cycle.
1	Pin 14 gets "H". The elevator mechanism starts lowering.
2	When the elevator has reached one position prior to the target one, a pulse is applied to pin 16.
3	Pin 21 gets "L".
4	When the home sw gets "L", the first disc signal is detected. Pin 16 gets "L".

5.6 Magazine eject.



SEQUENCE

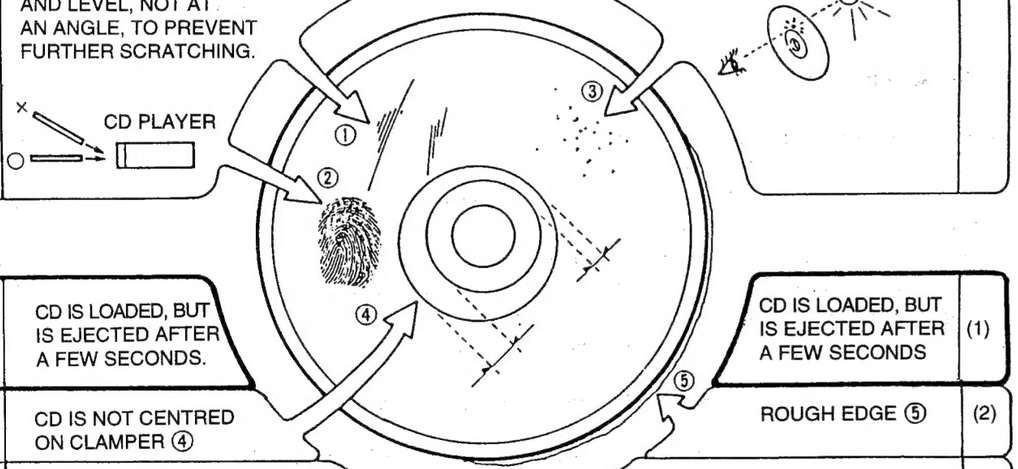
1	Pin 13 gets "H" for 1s.
2	When the magazine has been ejected, pin 22 gets "H".
3	Pin 14 gets "H" for 1s.
4	Eject cycle completed: pin 22 = "H", pin 20 = "L".
*	If eject is unsuccessful, the process will be repeated three times. After that the LCD shows "ERROR".

6. CD Symptoms and failure guide.

For symptoms occurring with specific discs.

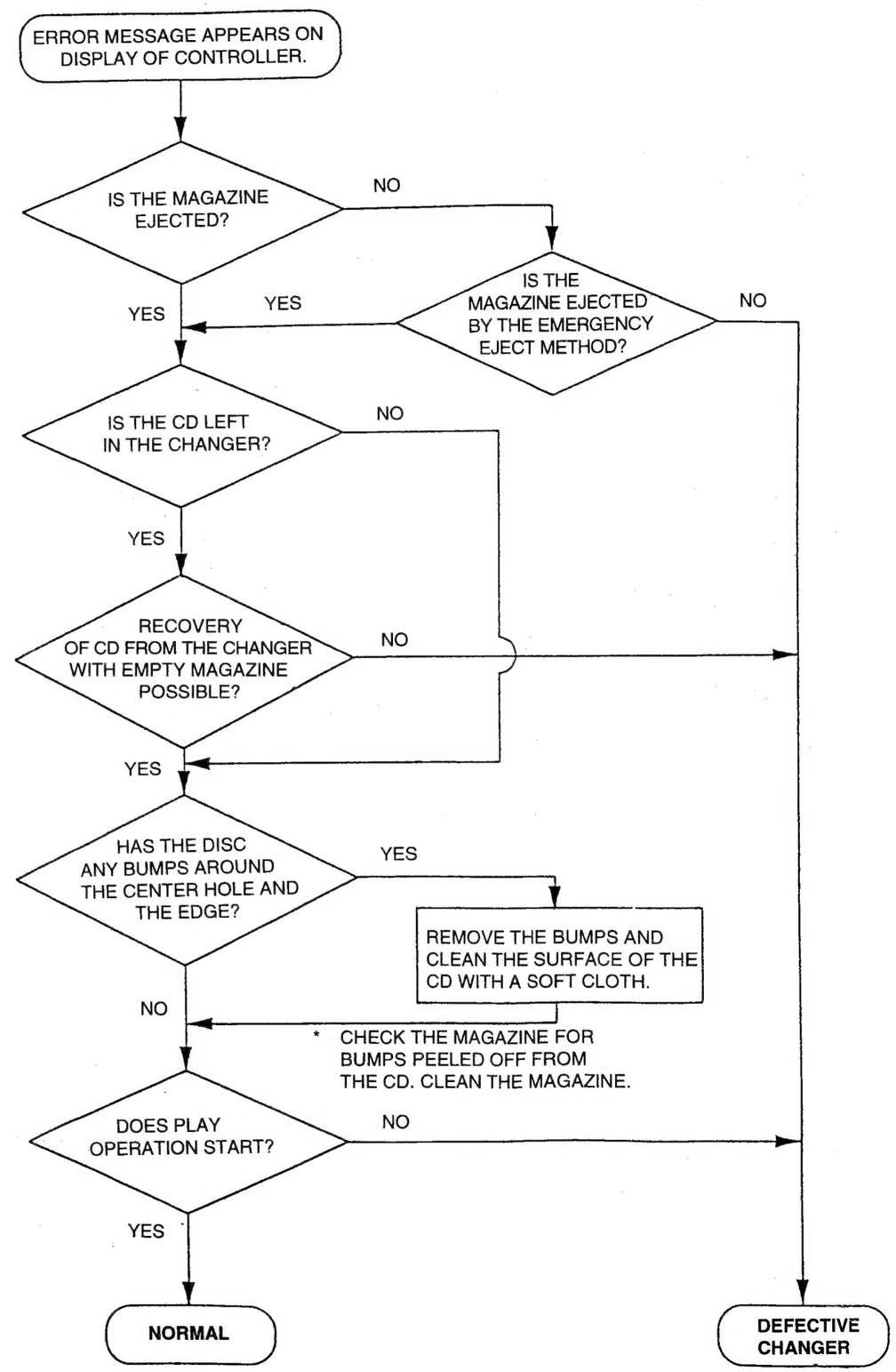
NOTE: (1) symptoms
(2) cause
(3) solution

(1)	SKIPS. STUCK ON ONE TRACK. CD IS EJECTED DURING PLAY.	SKIPS. STUCK ON ONE TRACK. CD IS EJECTED DURING PLAY. (1)
(2)	SCRATCHES ① FINGERPRINTS OR DUST ② (SURFACE NOT CLEAN)	PIN HOLES IN CD CAUSED DURING STAMPING PROCESS. REFLECTIVE MATERIAL MISSING ③ (2)
(3)	HANDLE CD BY EDGE ONLY. CLEAN CD BY USING A SPECIFICALLY DESIGNED CLEANING KIT FOR COMPACT DISCS. INSERT CD STRAIGHT AND LEVEL, NOT AT AN ANGLE, TO PREVENT FURTHER SCRATCHING.	CHECK FOR PIN HOLES BY HOLDING CD UP TO A LIGHT SOURCE AND OBSERVE IT AS SHOWN. **DEFECTIVE CD SHOULD NOT BE USED.** (3)



(1)	CD IS LOADED, BUT IS EJECTED AFTER A FEW SECONDS.	CD IS LOADED, BUT IS EJECTED AFTER A FEW SECONDS (1)
(2)	CD IS NOT CENTRED ON CLAMPER ④	ROUGH EDGE ⑤ (2)
(3)	CD HOLE NOT CENTRED (PRODUCTION PROCESS), PREVENTING TABLE OF CONTENTS TO BE READ AND TRIGGERING THE EJECT MECHANISM. **DEFECTIVE CD SHOULD NOT BE USED.**	ROUGH EDGE MAY TOUCH PARTS OF MECHANISM. SANDING EDGE OF CD (3)

7. ERROR DIAGNOSIS FLOW CHART.



8. Magazine emergency eject

Method:

- Fold a business card vertically in half.
- Slide the door of the changer to the right.
- Insert the card between the CD magazine and the changer mechanism.
- The magazine will be ejected when the card is inserted approx. 40mm.

Principle:

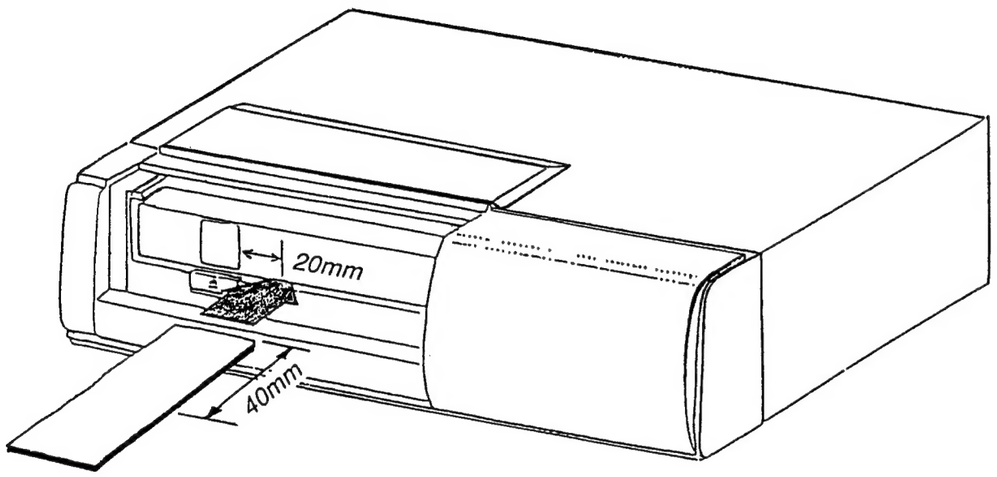


Fig. 10

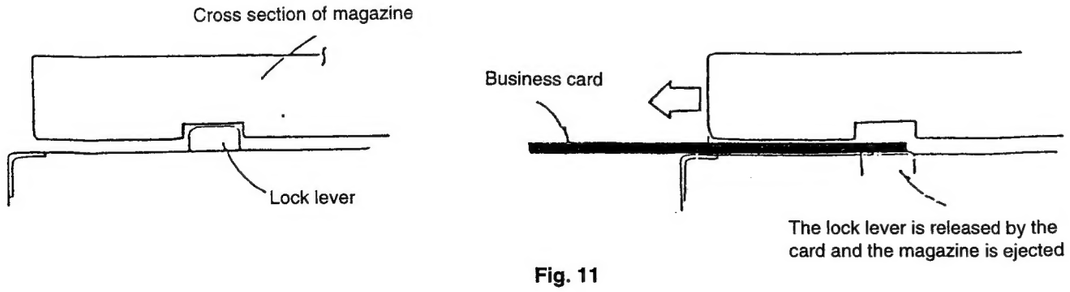


Fig. 11

9. Sensor status on errors.

Perform the repair based on the following information when the changer is offered for repair after an error indication appeared on the control set.

9.1 Relation between ERROR and sensors

Indication	DISCP	DOKSW	LODSW	DSCIN	ARMSW	MAGSW	HMPSW	Cause of error
ERROR (1)	-	X	X	X	X	-	-	A CD is caught between the magazine and the roller. Neither loading nor unloading is possible.
ERROR (2)	-	X	X	X	-	-	-	Unloading has been tried 3 times, but unloading is impossible.
ERROR (3)	-	X	X	X	-	-	-	Unloading has been tried for 3s, but unloading is impossible.
ERROR (4)	-	X	X	X	-	-	-	Loading has been tried for 3s, but loading is impossible.
ERROR (5)	-	-	-	-	X	-	-	After completing the unloading or loading, the loading arm-detector switch is not switched off for 3s.
ERROR (6)	X	-	-	-	-	-	X	Disc changing is not completed within 3s.
ERROR (7)	-	-	-	-	X	X	-	Eject operation has been executed 3 times, but the magazine cannot be ejected.

9.2 Sensor function

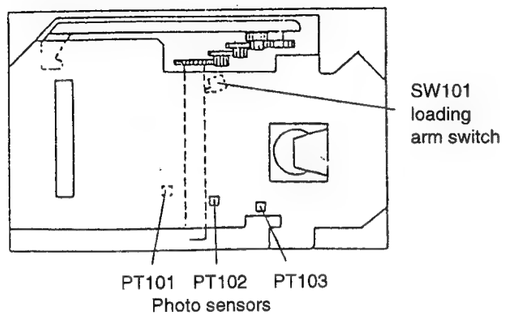
Sensor	Switching function for detecting	Item
DISCP	Position of the CD (photo)	PI101
DOKSW	Whether the CD is housed into the magazine (photo)	PT101
LODSW	Whether the CD is loaded into the carriage (photo)	PT102
DSCIN	Whether the carriage contains any CD (photo)	PT103
ARMSW	Status of the loading arm, pulling the CD from the magazine	SW101
MAGSW	Whether the magazine is being inserted into the changer	SW102
HMPSW	Whether the carriage has moved to the home position	SW103

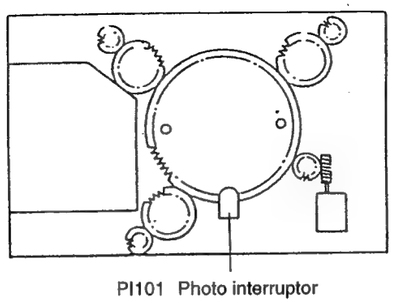
9.3 Conditions for completion of the loading/unloading operation

The judgement of completion is made by 3 sensors, viz. DOKSW, LODSW and DSCIN.

	DOKSW	LODSW	DSCIN
Loading complete	OFF (L)	ON (H)	ON (H)
Unloading complete	OFF (L)	OFF (L)	OFF (L)

a) If DOKSW is OFF, LODSW is ON and DSCIN is ON within 3s after starting of loading, ERROR (4) appears.
b) If DOKSW is OFF, LODSW is OFF and DSCIN is OFF within 3s after starting of unloading, ERROR (3) appears.
c) If unloading has been repeated 3 times and the CD cannot be inserted into the magazine, ERROR (2) appears.
d) If loading and unloading have been repeated 3 times and the CD cannot be inserted into the carriage or the magazine, ERROR (1) appears.
(e) If the loading arm-switch has not been switched OFF (L) within 3s after the loading has been completed or judgement has been made on the completion of unloading, ERROR (5) appears.





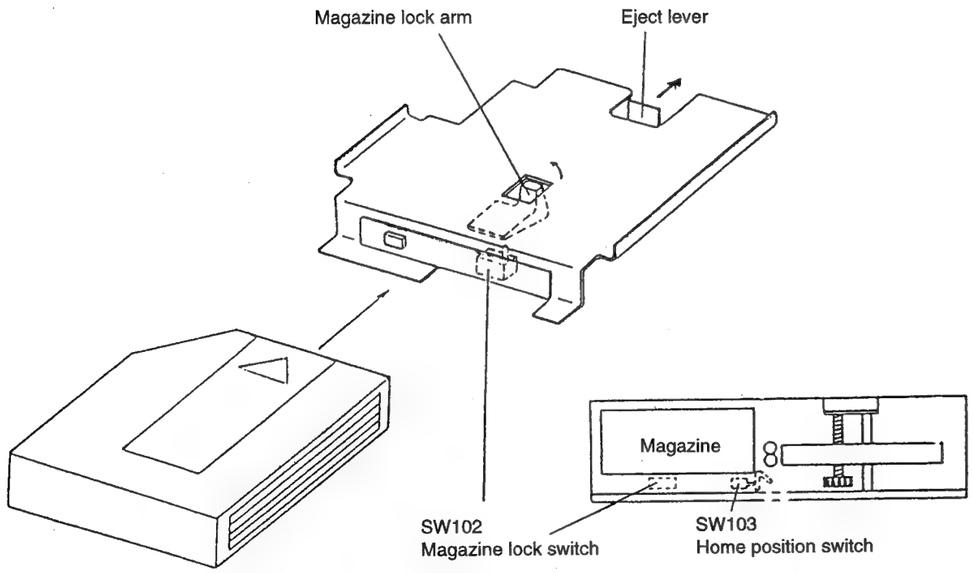


Fig. 12

9.4 Conditions for completion of disc ejection

The judgement is made by 2 switches, viz. ARMSW and MAGSW.

	ARMSW	MAGSW
Ejection complete	OFF (L)	OFF (H)

a) If the switches, ARMSW and MAGSW, have not been switched OFF, ERROR (7) appears.

9.5 Conditions for completion of disc change

The judgement is made by counting the number of pulses from DISCP (photo interruptor).

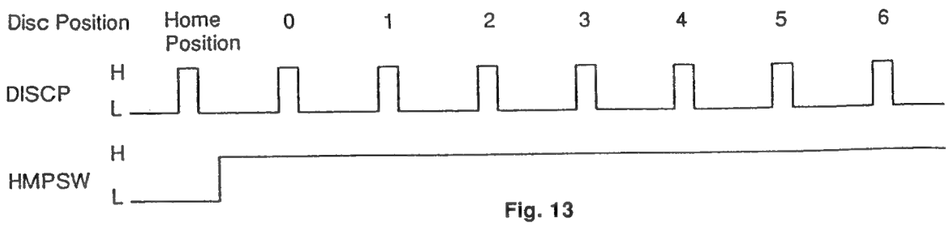


Fig. 13

a) If the pulse from DISCP has not been present for 3s during disc change, ERROR (6) appears.

9.6 Function after error indication

Error	Function after indication
(1)	No function.
(2)	Pulls the CD into the carriage and moves to home position, waits for signal from eject switch. When the eject button is pressed, ejects the magazine leaving the CD inside the mechanism.
(3)	Loads the CD into the mechanism again, performs unloading operation again. If CD cannot be unloaded after 3 times ERROR (3) will appear.
(4)	Performs the operation of the next CD and ERROR (4) will disappear.
(5)	Performs unloading operation in the loading mode, loading operation in unloading mode. After loading/unloading 3 times and if loading arm-switch has not switched OFF, ERROR (1) appears.
(6)	Waiting for signal from eject switch. When the eject button is pressed, moves the carriage to the home position and ejects the magazine. If any CD is left inside the mechanism after the eject operation, ERROR (2) will appear. If no CD is left inside, ERROR (6) will be replaced by "--".
(7)	Waiting for signal from eject switch. When the eject button is pressed, performs eject operation again. If magazine is not ejected after 3 times, ERROR (7) will appear.

10. Disassembly instructions

10.1 Cabinet etc.

- **Metal cover, pos. 2.**

  Remove screws 5 (left 2x, right 2x, rear 3x).
  Lift cover at the bottom side and slide it to the rear (mind the screws for hor/vert mounting).

- **Front, pos. 1.**

  Lift the side lugs over the locking hooks.
  Slide the front from the chassis.

- **Inner cover, pos. 14.**

  Remove screws 27.
  Slide the cover from the chassis.

- **Main pcb (Fig. 14).**

  Remove base plate 2.
  Remove screws marked "■".
  Remove bracket marked "@".
  Slide the pcb in the direction of the arrow to release it from 3 locking pins.
  Disconnect all connectors, unsolder ground wire.

- **Damper brackets, pos. 16, 22 (Fig. 14-16).**

  Remove 8 damper holders 7 by lifting hooks D.
  Remove damper brackets 16, 22 (screw "▲" in each damper).
  Unhook springs 11, 25 from the chassis.

10.2 CD mechanism

- **Pick-up unit, pos. 278 (Fig. 17).**

  Remove screws marked "⊕".

- **Sled motor, pos. M103 (Fig. 17).**

  Remove solder (A).
  Remove bracket with motor (screws marked "X").
  Remove solder (B).
  Remove screw marked "❖".

- **Head unit, pos. HD101 (Fig. 17).**

  Remove shaft bracket, screw bracket (screws marked "◊").

- **LED pcb (Fig. 18).**

  Remove screws marked "●".

- **Switch pcb (Fig. 18).**

  Remove screw inside inner cover 14.
  Lift pcb from black and clear holders.

- **Photo pcb (Fig. 19, 20).**

  Remove top chassis and base chassis (7 screws marked "∝").
  Remove chassis CR.
  Remove solder C.
  Remove screw marked "✪".

- **Sensor pcb (Fig. 21).**

  Remove solder D and E.
  Remove screws marked "☆".

- **Loading motor, pos. M101 (Fig. 21).**

  Remove solder E.
  Remove screws marked "★".

- **Elevator motor, pos. M102 (Fig. 22, 23).**

  Remove gear C (washer A).
  Remove motor bracket (screws marked "✧").
  Remove solder F.
  Remove screws marked "✦".

- **Interrupt pcb (Fig. 22, 23).**

  Remove motor bracket and solder (see above).
  Remove screws marked "#".

- **Magazine photo pcb (Fig. 24).**

  Remove magazine chassis (screws marked "✳").
  Remove screws marked "©".

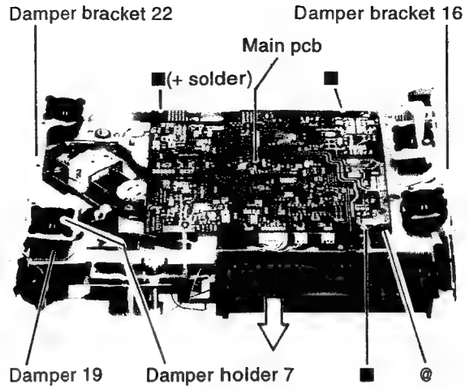


Fig 14

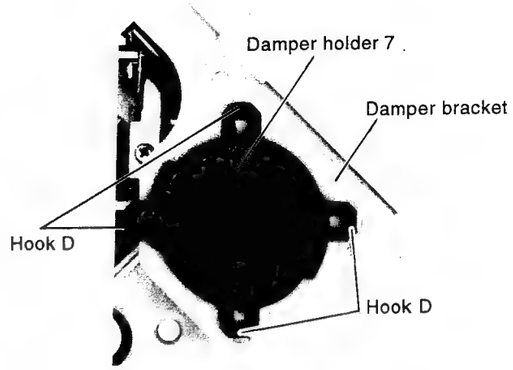


Fig 15

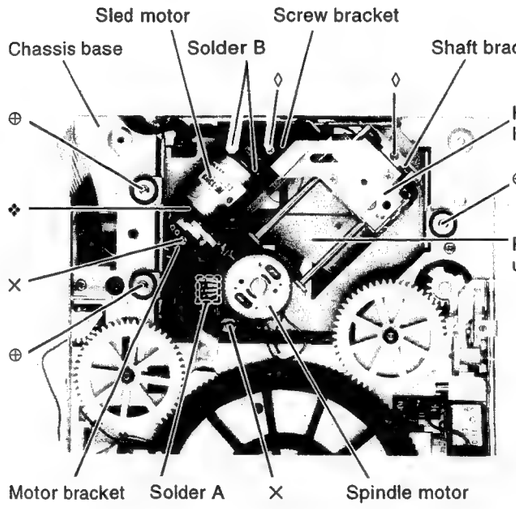


Fig 17

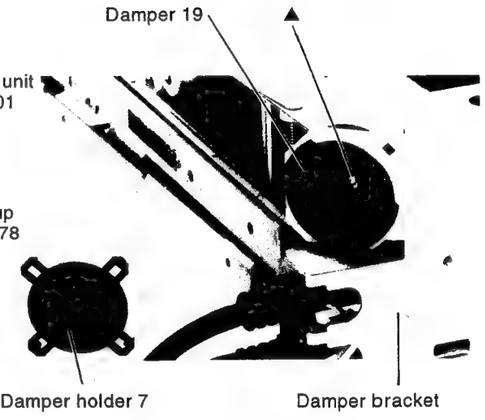


Fig 16

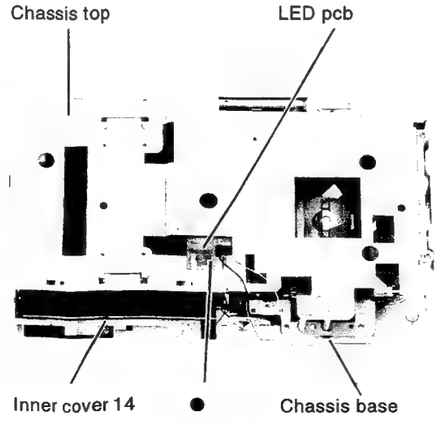


Fig 18

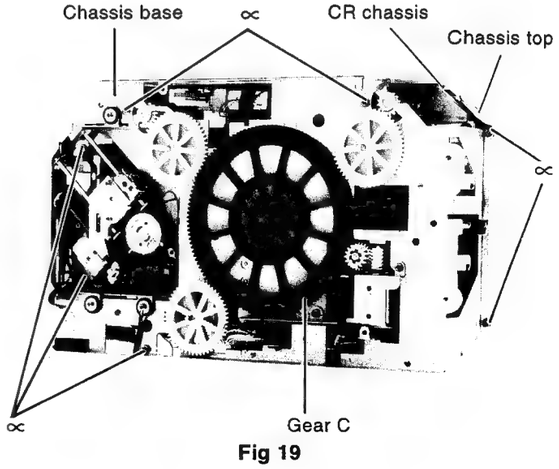


Fig 19

PCS 73 962

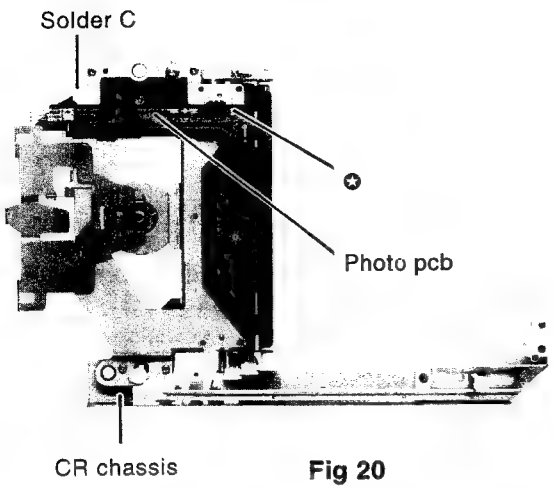


Fig 20

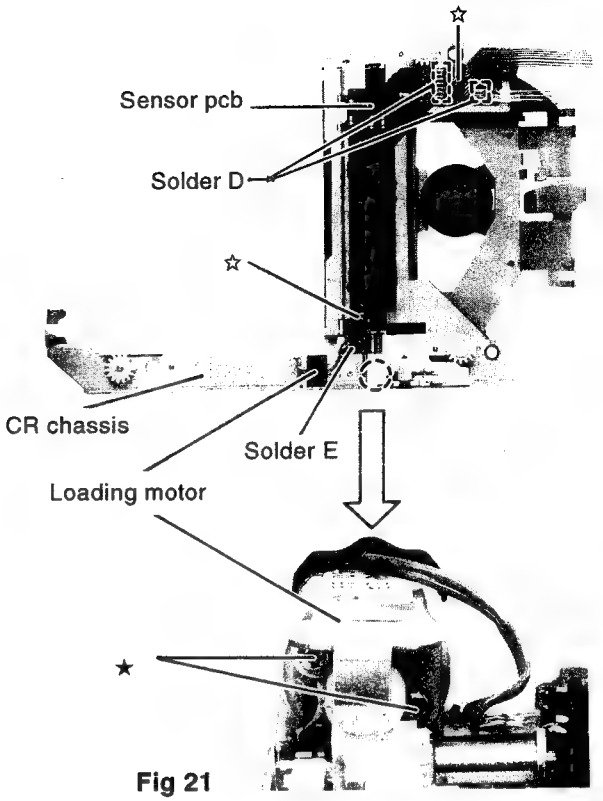


Fig 21

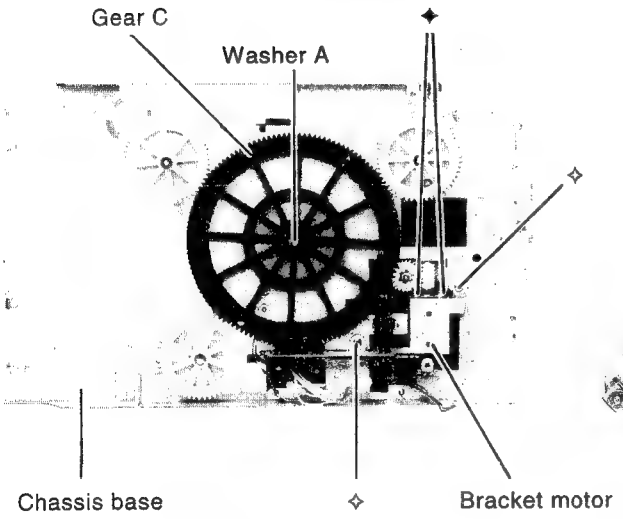


Fig 22

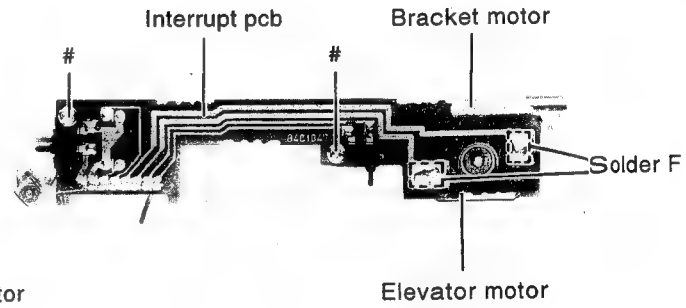


Fig 23

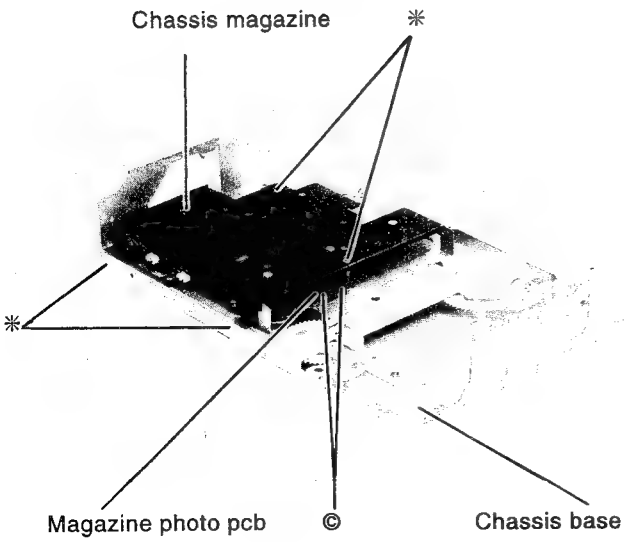


Fig 24

PCS 73 963

11. Checks and adjustments

11.1 Service tools

Test CD "skew disc"	4822 701 11922
Test CD "eccentricity"	4822 701 11923
Test CD "5" & "5A"	4822 397 30096
Test CD "Audio signals 1"	4822 397 30184
Test CD "Max. diameter"	4822 397 60141
Jig height adjustment	4822 395 80412

11.2 Checks

- **Initial start-up, rafoc unit.**

  Insert a magazine with test CD "skew disc".
  Play tracks 1-9 (first 20 min.) without interruptions.

- **Disc drive motor and servo motor.**

  Insert a magazine with test CD "eccentricity".
  Play tracks 1-20 without interruptions.

- **Interruptions, black dots, finger prints.**

  Insert a magazine with test CD "5A".
  Playback tracks 9, 11-17 (prefered: 17), 18, 19 (prefered 19) without interruptions.

- **Min/max read-out diameter.**

  Insert a magazine with test CD "Max. diameter".
  Playback tracks 1 and 14 without interruptions.

- **Specification.**

  Check with test CD "Audio signals 1".

11.3 Adjustments

- **Elevator height (Fig. 25-27)**

  Remove 3 gears D (2 washers A and ring B).
  Rotate 3 gears E and move chassis CR in direction F (to the level of the CD magazine).
  Insert 3 adjustment jigs near gears E between chassis and the chassis CR.
  Adjust each gear E to min. gap and a smooth moving of each jig.
  Adjust gear C to fit H-hole with hole in chassis.
  Mount gears D. Take care there is no gap between gears E and C.
  Fix gears D with the washers/ring.

- **Wow & Flutter (Fig. 28)**

  Set VR103 fully anti-clockwise.
  Insert a magazine with test CD "Audio signals 1".
  Switch to mode playback (track 1).
  Confirm the signal from T.P.1 shows a value on the meter.
  Adjust VR103 to min. value.
  Adjust VR103 to +0.5ns.

- **Tracking balance (fig. 28, 29)**

  Connect T.P.3 - T.P.4 with a wire.
  Insert a magazine with test CD "Audio signals 1".
  Switch to mode playback (track 49).
  Adjust VR101 to max. symmetry (VR=0V).

  Note:
  Remove the wire T.P.3-T.P.4 when finished.

- **Tracking offset (Fig. 28-30)**

  Insert a magazine with test CD 5A.
  Switch to mode playback (track 9).
  Adjust VR102 to min. distortion.
  Adjust VR101 (tracking balance).

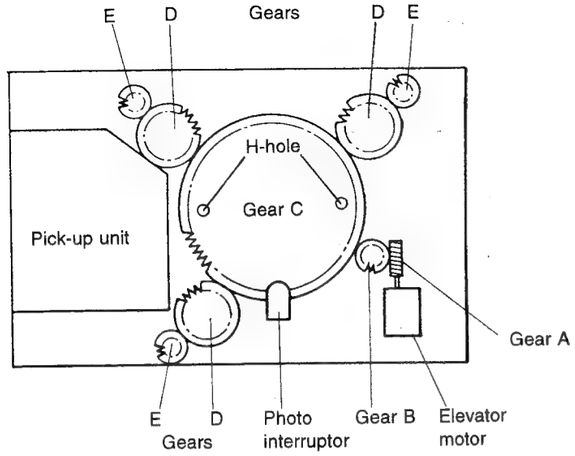


Fig. 25

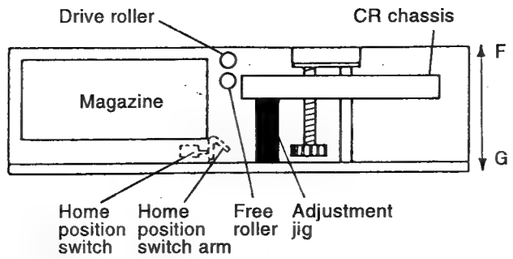


Fig 26

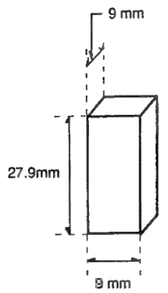
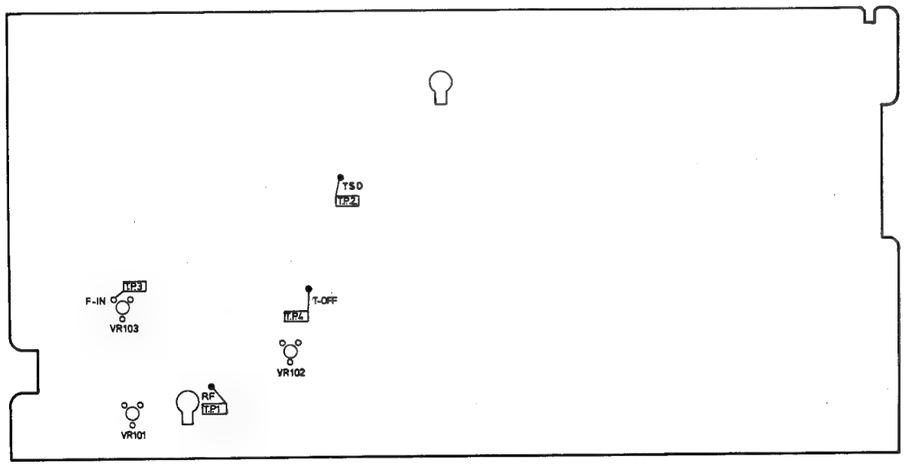


Fig. 27



SOLDER SIDE

Fig. 28

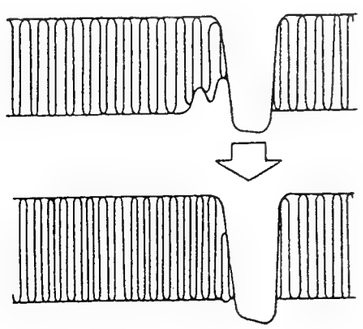


Fig. 29

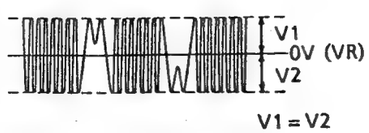
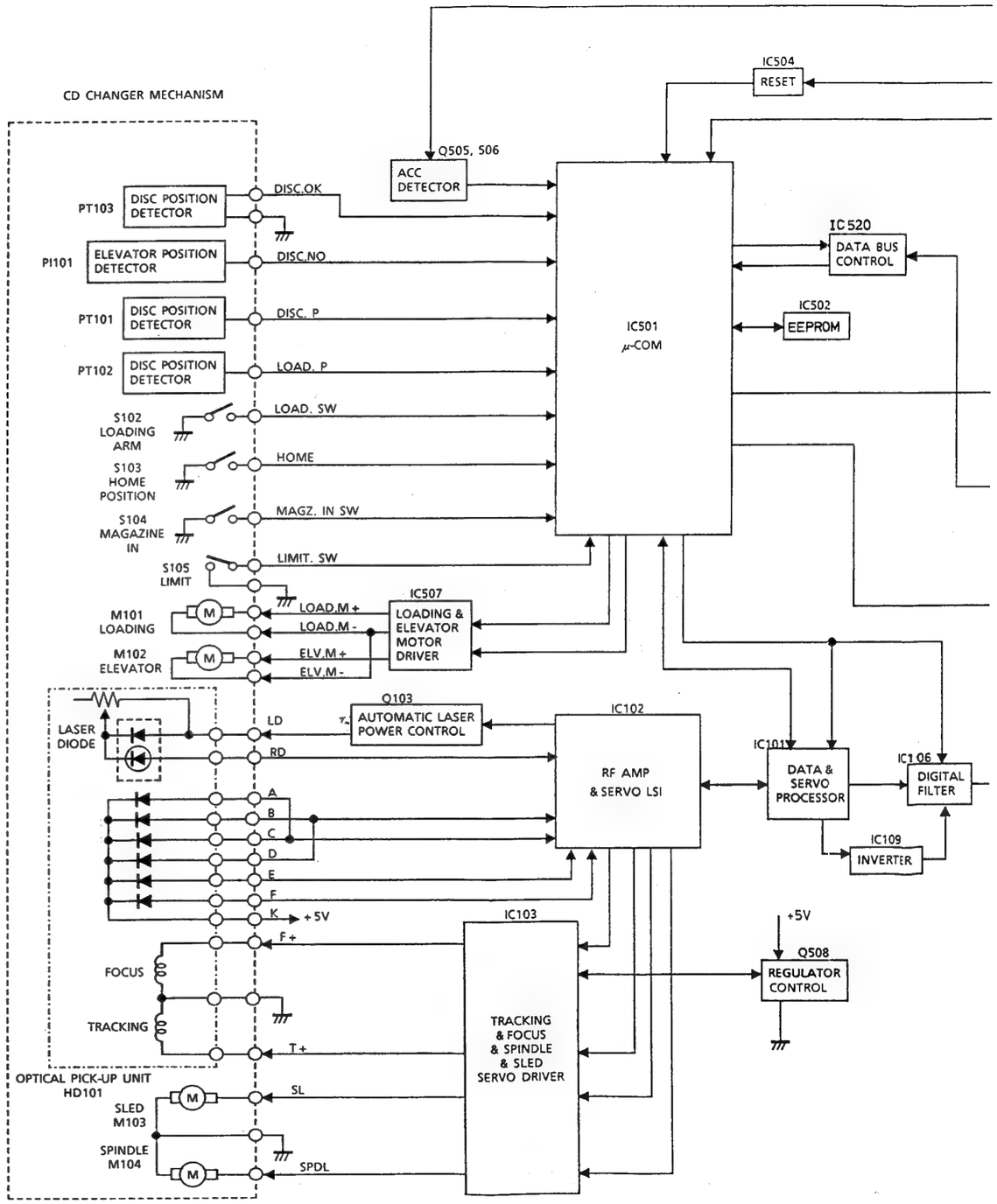
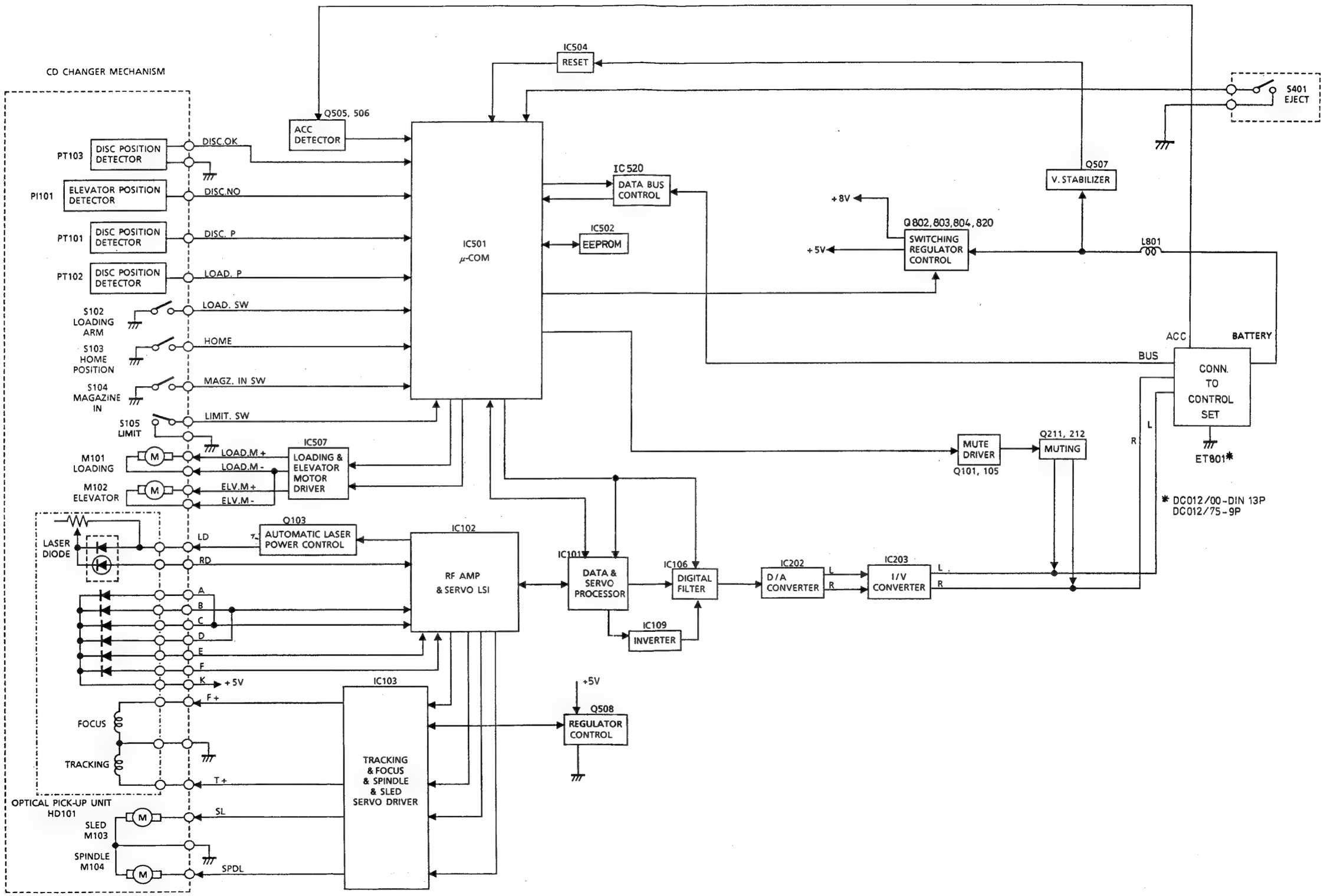


Fig. 30

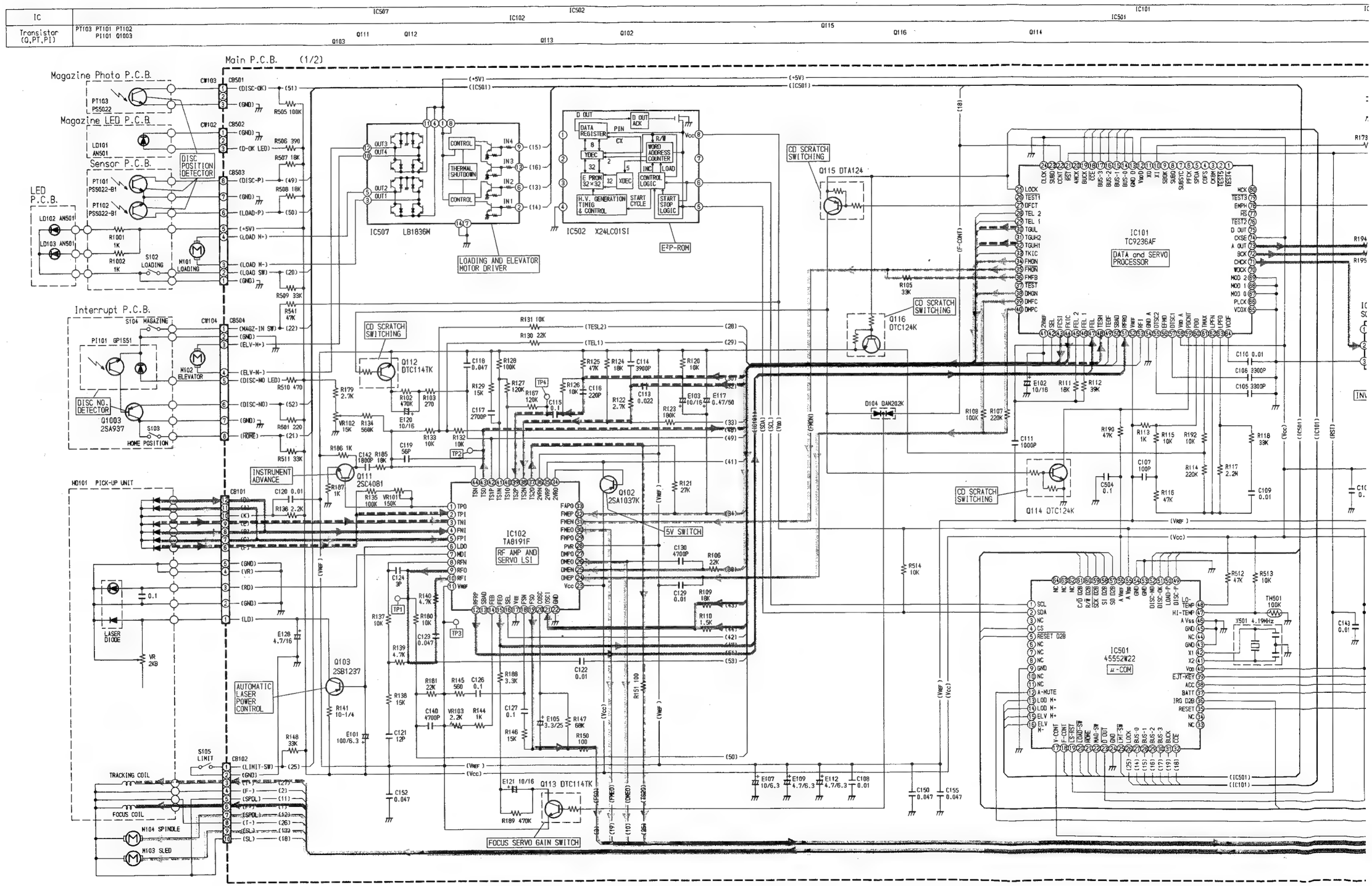
12. Block diagram

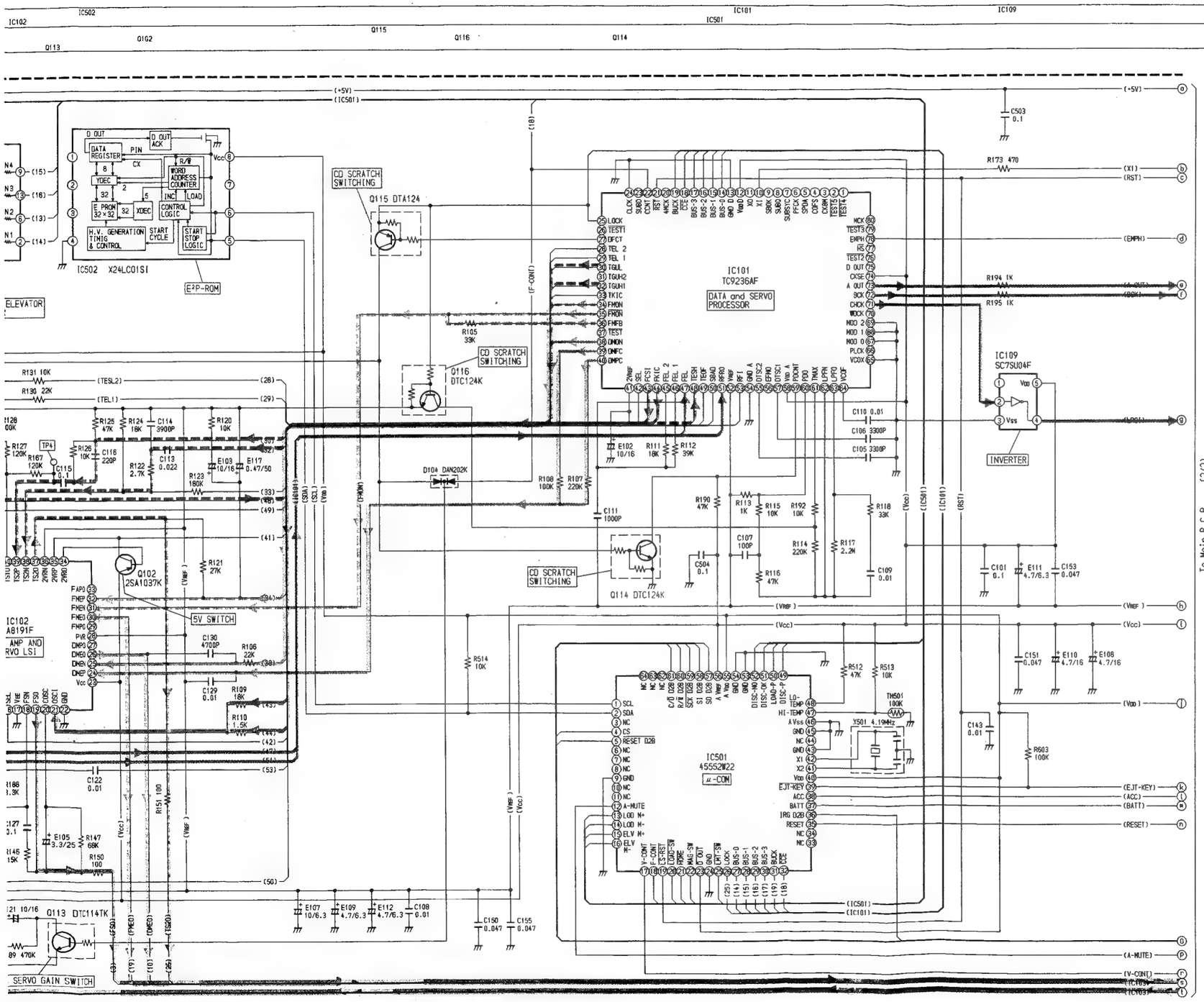


12. Block diagram



13. Circuit diagram I





IC101

1	NC	17	PS	33	2.05V	49	2.1V	65	0V
2	NC	18	PS	34	2.07V	50	2.1V	66	NC
3	NC	19	PS	35	2.1V	51	2.2V	67	0V
4	NC	20	NC	36	2.1V	52	2.1V	68	0V
5	NC	21	4.8V	37	NC	53	2.5V	69	0V
6	NC	22	0V	38	2.1V	54	0V	70	NC
7	NC	23	NC	39	PS	55	2.53V	71	PS
8	NC	24	0V	40	PS	56	NC	72	PS
9	NC	25	PS	41	4.2V	57	2.53V	73	PS
10	PS	26	NC	42	5V	58	5V	74	5V
11	NC	27	PS	43	2.5V	59	PS	75	PS
12	5V	28	2.1V	44	2.5V	60	PS	76	NC
13	0V	29	2.1V	45	2.1V	61	2.1V	77	NC
14	PS	30	2.1V	46	2.1V	62	2.1V	78	5V
15	PS	31	NC	47	2.1V	63	2V	79	NC
16	PS	32	2.1V	48	2.1V	64	2.2V	80	NC

IC102

1	1.8V	16	5V	31	2.1V
2	2.1V	17	0V	32	2.09V
3	2.1V	18	2.1V	33	NC
4	2.1V	19	2.2V	34	4.45V
5	2.1V	20	2.15V	35	4.19V
6	3.95V	21	2.52V	36	2.1V
7	0.18V	22	0V	37	2.05V
8	2.1V	23	5.03V	38	2.09V
9	2.45V	24	2.17V	39	2.09V
10	2.1V	25	2.17V	40	2.09V
11	2.1V	26	2.35V	41	2.09V
12	2.2V	27	NC	42	2.09V
13	NC	28	2.1V	43	2.1V
14	2.08V	29	NC	44	2.1V
15	2.11V	30	2.05V		

IC109

1	NC
2	PS
3	0V
4	PS
5	5V

IC501

1	4.86V	17	4.81V	33	NC	49	4.99V
2	4.86V	18	0V	34	NC	50	0.14V
3	NC	19	4.85V	35	4.86V	51	0.17V
4	PS	20	0V	36	PS	52	5.03V
5	PS	21	0V	37	4.88V	53	0V
6	NC	22	0V	38	4.85V	54	0V
7	NC	23	4.86V	39	4.81V	55	5.03V
8	NC	24	0V	40	4.86V	56	5.03V
9	0V	25	5.02V	41	PS	57	PS
10	NC	26	5V	42	PS	58	PS
11	NC	27	PS	43	0V	59	PS
12	0V	28	PS	44	NC	60	PS
13	4.84V	29	PS	45	0V	61	PS
14	4.84V	30	PS	46	0V	62	NC
15	4.84V	31	PS	47	4.31V	63	NC
16	4.84V	32	PS	48	5.01V	64	NC

IC502

1	NC
2	NC
3	NC
4	0V
5	4.86V
6	4.86V
7	NC
8	4.85V

IC507

1	7.34V	8	7.34V
2	4.83V	9	4.83V
3	0V	10	0V
4	7.34V	11	7.34V
5	0V	12	0V
6	4.83V	13	4.83V
7	0V	14	0V

	E	C	B
Q102	5.03V	4.2V	4.44V
Q103	4.5V	1.8V	3.95V
Q111	1.2V	1.2V	1.5V
Q112	2.1V	2.05V	PS
Q113	2.1V	2.05V	PS
Q114	0V	PS	PS
Q115	PS	0V	PS
Q116	2.09V	2.1V	PS

E.V.M.

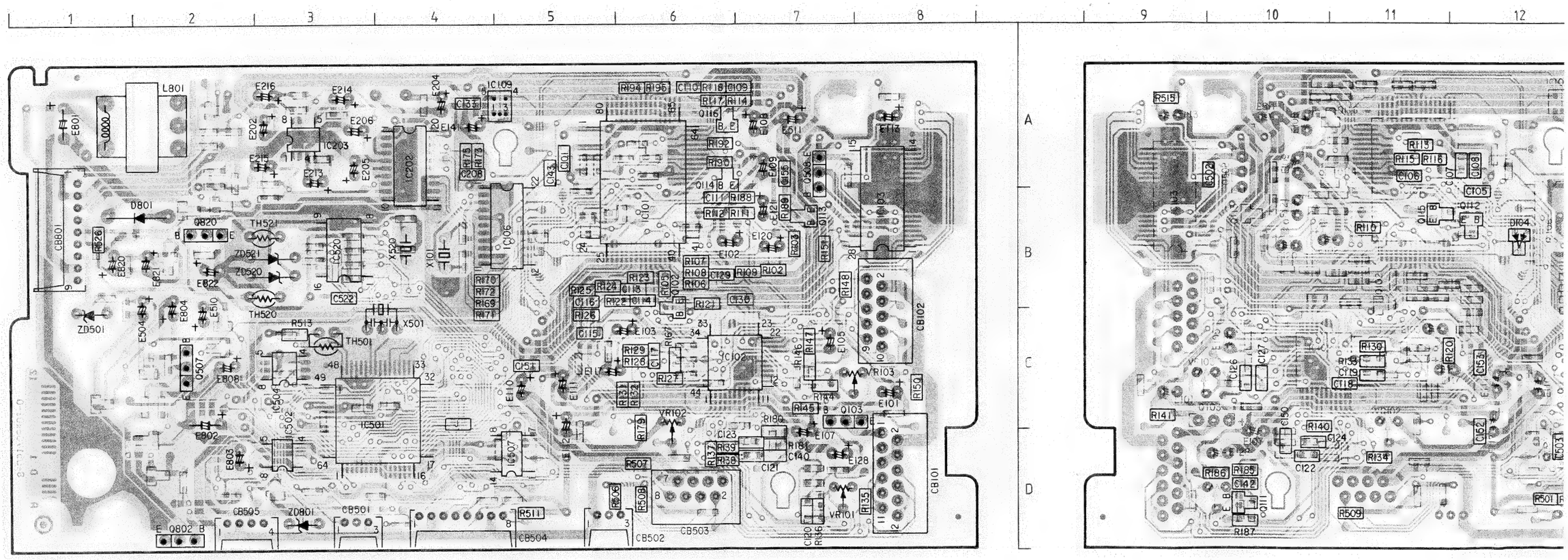
Mode: playback (test CD audio signals disc 1, track no.1 1 kHz
All resistor values are in Ohm; K = 1000
All capacitor values are in μF; P = 0.000001

CD Signal Line (Digital)
Focus Error Signal Line
Tracking Error Signal Line
Spindle Drive Signal Line
Sled Drive Signal Line

PCS 73 9R6

14. Layout main PCB

C101	A5	C111	B6	C121	D7	C142	D10	C211	A14	C520	B13	E101	C8	E108	A7	E112	C5	E128	D7	E205	A14	E216	A14	E801	A1	E820	B1	IC102	C7	IC202	A4	IC507	D5	Q103	C10	Q115	B11	Q507	C15	R103	B7	R113	A11	R123	B6	R131	C6	R140	C10	R169	B4
C103	B13	C113	B6	C122	D10	C143	A5	C212	A14	C521	B13	E102	B6	E109	A10	E113	A9	E128	D10	E206	A14	E216	A3	E802	C2	E820	B2	IC102	C10	IC203	A3	IC507	D12	Q103	C7	Q116	A11	Q508	A10	R105	B6	R114	A7	R124	B5	R132	C6	R141	C9	R170	B4
C104	B13	C114	B6	C123	C7	C150	D10	C213	A15	C522	B3	E102	B11	E109	A10	E113	A8	E141	A4	E206	A3	E216	A14	E802	C15	E820	B16	IC103	B8	IC203	A14	IC520	B14	Q105	C15	Q116	A6	Q508	A7	R106	B6	R115	A11	R125	B5	R133	C11	R145	C7	R171	C4
C105	B12	C115	C5	C124	D11	C151	C5	C214	A15	C805	C15	E103	C6	E109	A7	E117	C12	E141	A13	E213	A3	E504	C15	E803	D2	E821	B2	IC103	B9	IC501	C4	IC520	B3	Q111	D10	Q211	B15	Q802	D2	R107	B6	R116	A11	R126	C5	R134	D11	R146	C7	R172	B4
C106	A11	C116	B5	C126	C10	C152	D12	C215	A14	C820	B15	E103	C11	E110	C5	E117	C5	E202	A14	E213	A14	E510	C2	E803	D15	E821	B15	IC106	B12	IC501	C13	L801	A16	Q112	B12	Q212	A15	Q802	D15	R108	B6	R117	A6	R127	C6	R135	D8	R147	C7	R173	A4
C107	A12	C117	C6	C127	C10	C153	C12	C501	C14	D104	B12	E105	C10	E110	C12	E120	B10	E202	A3	E214	A14	E510	C15	E804	C15	E822	B2	IC106	B5	IC502	D14	L801	A2	Q113	B7	Q401	D14	Q803	D15	R109	B7	R118	A6	R128	C6	R136	D7	R148	B7	R175	A4
C108	A12	C118	C11	C130	B7	C155	A7	C502	A10	D801	B15	E107	D10	E111	C5	E120	B7	E204	A13	E214	A3	E511	A10	E804	B2	E822	B15	IC109	A12	IC502	D3	Q101	B15	Q113	B10	Q505	C15	Q804	D15	R110	B11	R120	C12	R129	B6	R137	D6	R150	C8	R179	C6
C109	A7	C119	C11	C133	A4	C204	A13	C503	D12	D801	B2	E107	D7	E111	C12	E121	B7	E204	A4	E215	A14	E511	A7	E808	C15	IC101	A11	IC109	A5	IC504	C14	Q102	B11	Q114	A6	Q506	C16	Q820	B15	R111	B7	R121	B6	R129	C6	R138	D6	R151	B7	R180	D7
C110	A6	C120	D7	C140	D7	C208	A4	C504	C14	E101	C9	E108	A10	E112	C12	E121	B10	E205	A3	E215	A3	E801	A16	E808	C2	IC101	B6	IC202	A13	IC504	C3	Q102	B6	Q114	A11	Q507	C2	R102	B7	R112	B6	R122	B6	R130	C11	R139	D6	R167	C6	R181	D7



205	A14	E216	A14	E801	A1	E820	B1	IC102	C7	IC202	A4	IC507	D5	Q103	C10	Q115	B11	Q507	C15	R103	B7	R113	A11	R123	B6	R131	C6	R140	C10	R169	B4	R185	D10	R217	B14	R507	D6	R520	B14	R541	D13	TH501	C14	VR103	C8	ZD501	C1
206	A14	E216	A3	E802	C2	E820	B2	IC102	C10	IC203	A3	IC507	D12	Q103	C7	Q116	A11	Q508	A10	R105	B6	R114	A7	R124	B5	R132	C6	R141	C9	R170	B4	R186	D10	R218	A14	R508	D6	R521	B14	R550	C15	TH520	B14	VR103	C10	ZD502	C15
206	A3	E216	A14	E802	C15	E820	B16	IC103	B8	IC203	A14	IC520	B14	Q105	C15	Q116	A6	Q508	A7	R106	B6	R115	A11	R125	B5	R133	C11	R145	C7	R171	C4	R187	D10	R225	A15	R509	D11	R522	B14	R603	C13	TH520	B3	X101	B4	ZD520	B3
213	A3	E504	C15	E803	D2	E821	B2	IC103	B9	IC501	C4	IC520	B3	Q111	D10	Q211	B15	Q802	D2	R107	B6	R116	A11	R126	C5	R134	D11	R146	C7	R172	B4	R188	B7	R226	A15	R510	D13	R523	B14	R604	C14	TH521	B3	X101	B13	ZD520	B14
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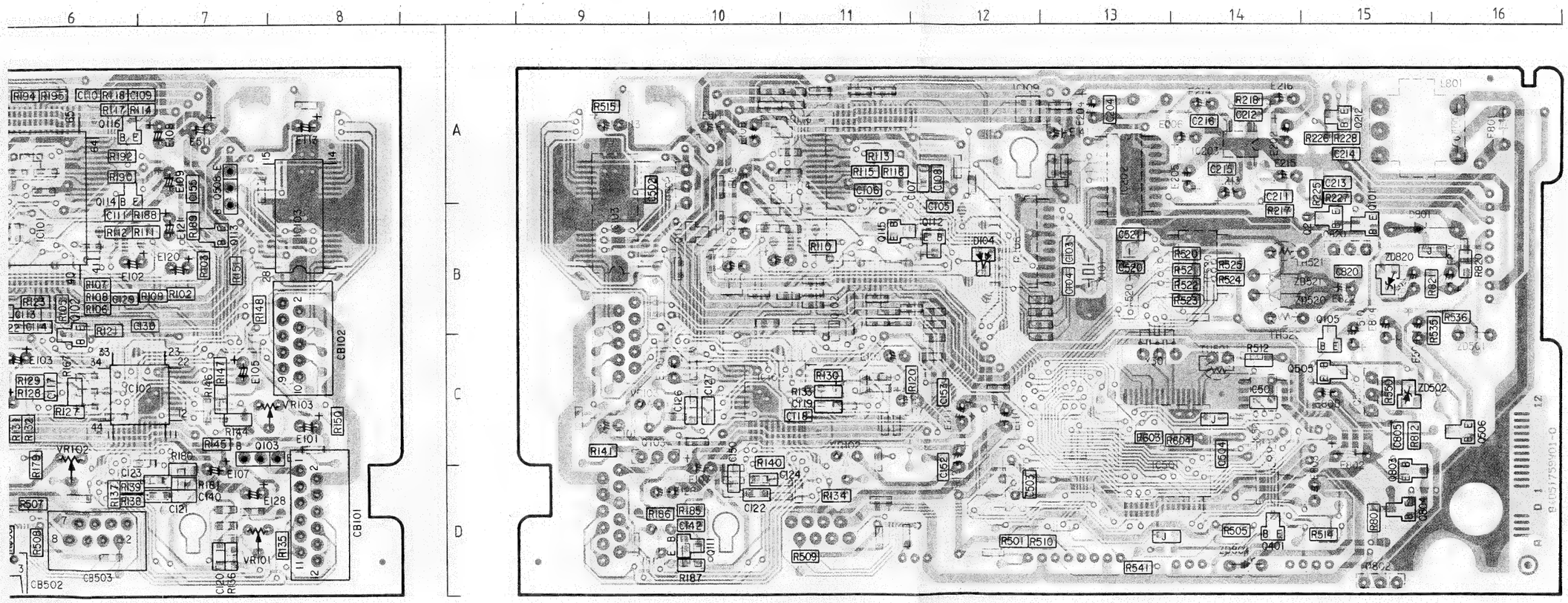
214	A14	E510	C15	E804	C15	E822	B2	IC106	B5	IC502	D14	L801	A2	Q113	B7	Q401	D14	Q803	D15	R109	B7	R118	A6	R128	C6	R136	D7	R148	B7	R175	A4	R190	A6	R228	A15	R512	C14	R525	B14	R812	C15	VR101	D9	X501	C4	ZD521	B14
214	A3	E511	A10	E804	B2	E822	B15	IC109	A12	IC502	D3	Q101	B15	Q113	B10	Q505	C15	Q804	D15	R110	B11	R120	C12	R129	B6	R137	D6	R150	C8	R179	C6	R192	A6	R501	D12	R513	C3	R526	B1	R820	B16	VR101	D7	X520	B13	ZD801	D3
215	A14	E511	A7	E808	C15	IC101	A11	IC109	A5	IC504	C14	Q102	B11	Q114	A6	Q506	C16	Q820	B15	R111	B7	R121	B6	R129	C6	R138	D6	R151	B7	R180	D7	R194	A6	R505	D14	R514	D15	R535	B16	R821	B16	VR102	C6	X520	B4	ZD801	D14
215	A3	E801	A16	E808	C2	IC101	B6	IC202	A13	IC504	C3	Q102	B6	Q114	A11	Q507	C2	R102	B7	R112	B6	R122	B6	R130	C11	R139	D6	R167	C6	R181	D7	R195	A6	R506	D6	R515	A9	R536	B16	TH501	C3	VR102	C11	ZD501	C16	ZD820	B15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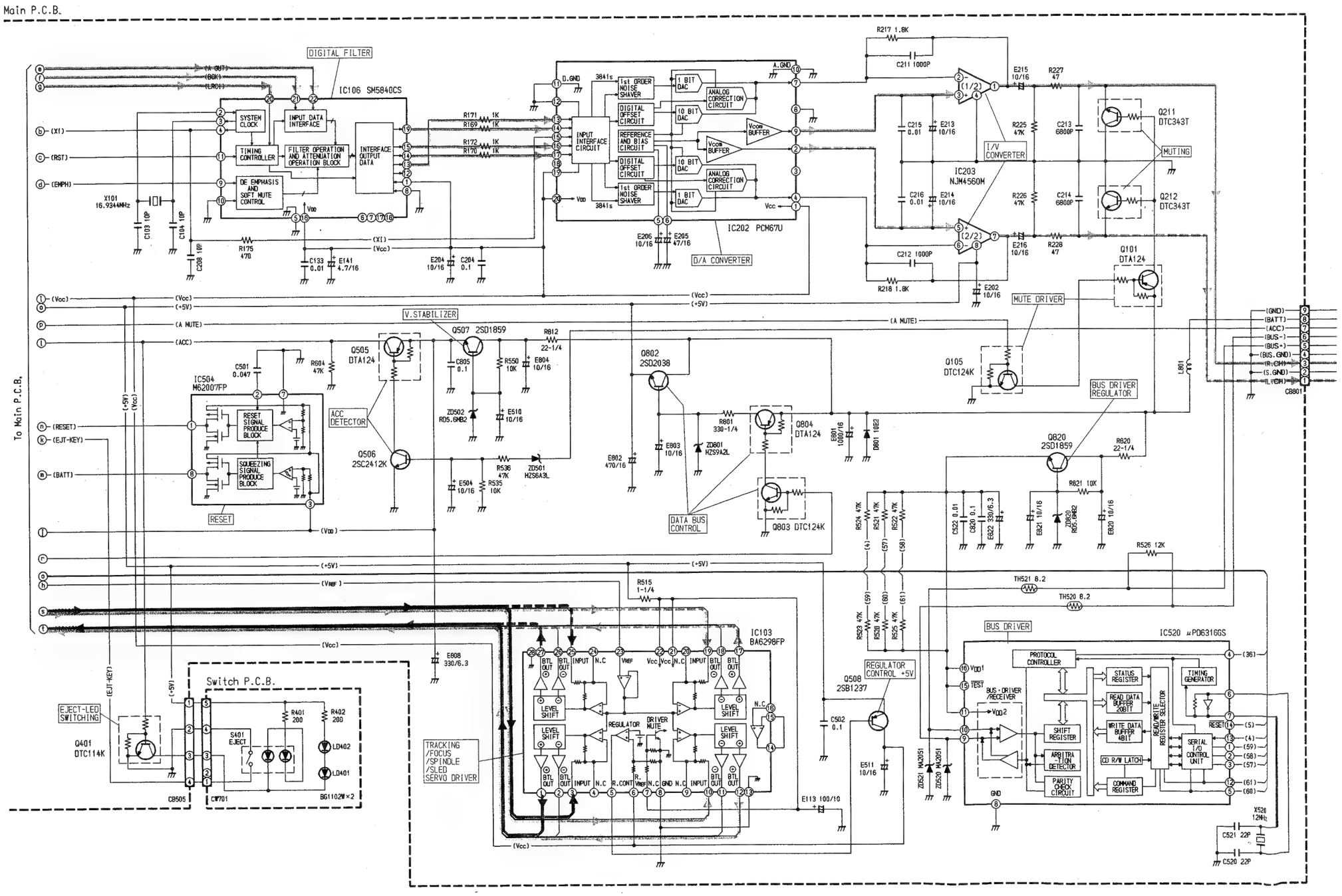
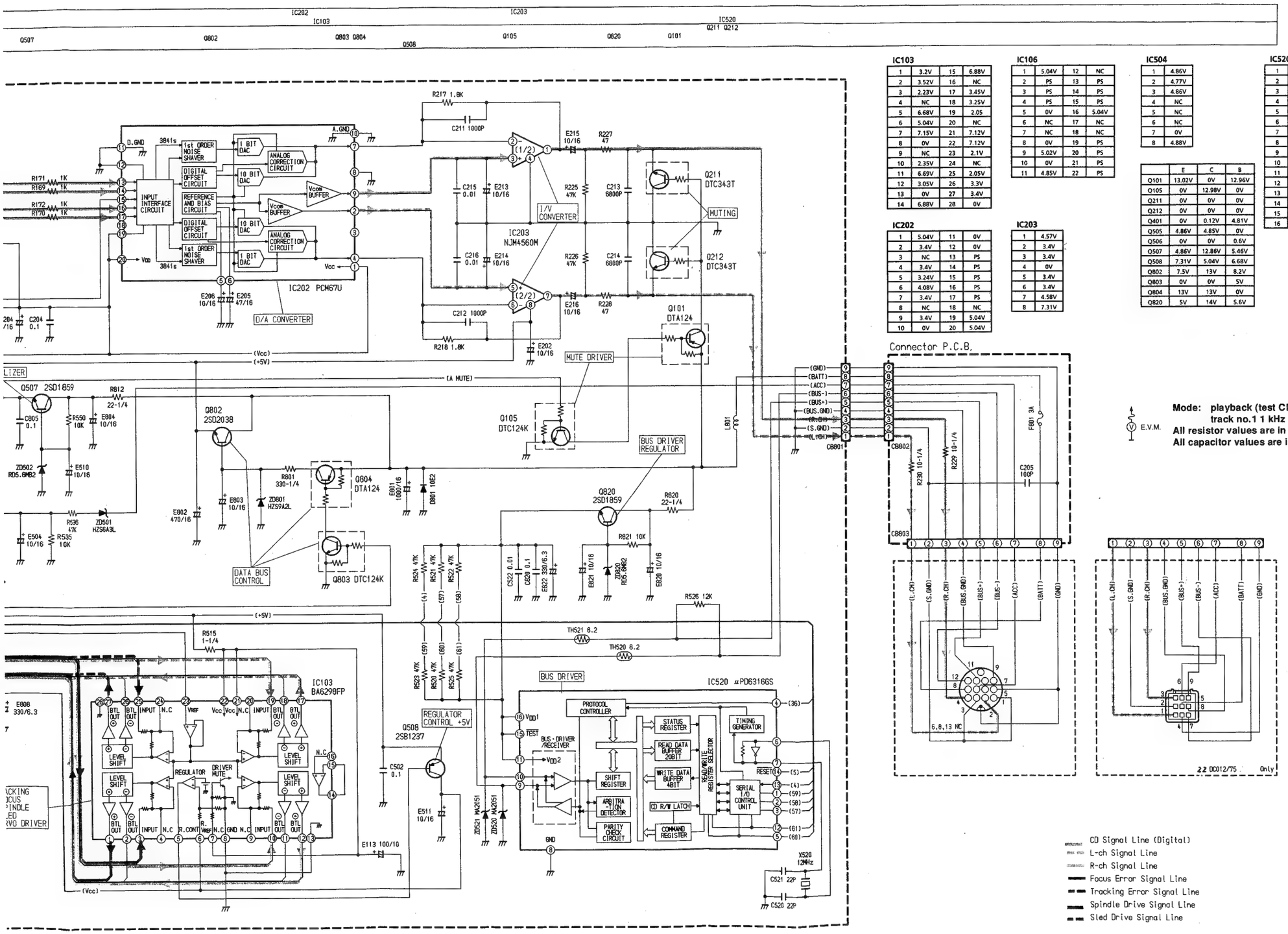
15. Circuit diagram II

IC	IC504	IC106	IC202	IC203	IC520
			IC103		Q211 Q212
Transistor (Q)	Q401	Q505 Q506 Q507	Q802 Q803 Q804 Q508	Q105	Q820 Q101





IC103

1	3.2V	15	6.88V
2	3.52V	16	NC
3	2.23V	17	3.45V
4	NC	18	3.25V
5	6.68V	19	2.05
6	5.04V	20	NC
7	7.15V	21	7.12V
8	0V	22	7.12V
9	NC	23	2.1V
10	2.35V	24	NC
11	6.69V	25	2.05V
12	3.05V	26	3.3V
13	0V	27	3.4V
14	6.88V	28	0V

IC106

1	5.04V	12	NC
2	PS	13	PS
3	PS	14	PS
4	PS	15	PS
5	0V	16	5.04V
6	NC	17	NC
7	NC	18	NC
8	0V	19	PS
9	5.02V	20	PS
10	0V	21	PS
11	4.85V	22	PS

IC504

1	4.86V
2	4.77V
3	4.86V
4	NC
5	NC
6	NC
7	0V
8	4.88V

IC520

1	PS
2	PS
3	PS
4	PS
5	PS
6	PS
7	PS
8	0V
9	PS
10	PS
11	5V
12	PS
13	PS
14	PS
15	5V
16	5V

IC202

1	5.04V	11	0V
2	3.4V	12	0V
3	NC	13	PS
4	3.4V	14	PS
5	3.24V	15	PS
6	4.08V	16	PS
7	3.4V	17	PS
8	NC	18	NC
9	3.4V	19	5.04V
10	0V	20	5.04V

IC203

1	4.57V
2	3.4V
3	3.4V
4	0V
5	3.4V
6	3.4V
7	4.58V
8	7.31V

	E	C	B
Q101	13.02V	0V	12.96V
Q105	0V	12.98V	0V
Q211	0V	0V	0V
Q212	0V	0V	0V
Q401	0V	0.12V	4.81V
Q505	4.86V	4.85V	0V
Q506	0V	0V	0.6V
Q507	4.86V	12.86V	5.46V
Q508	7.31V	5.04V	6.68V
Q802	7.5V	13V	8.2V
Q803	0V	0V	5V
Q804	13V	13V	0V
Q820	5V	14V	5.6V

E.V.M.

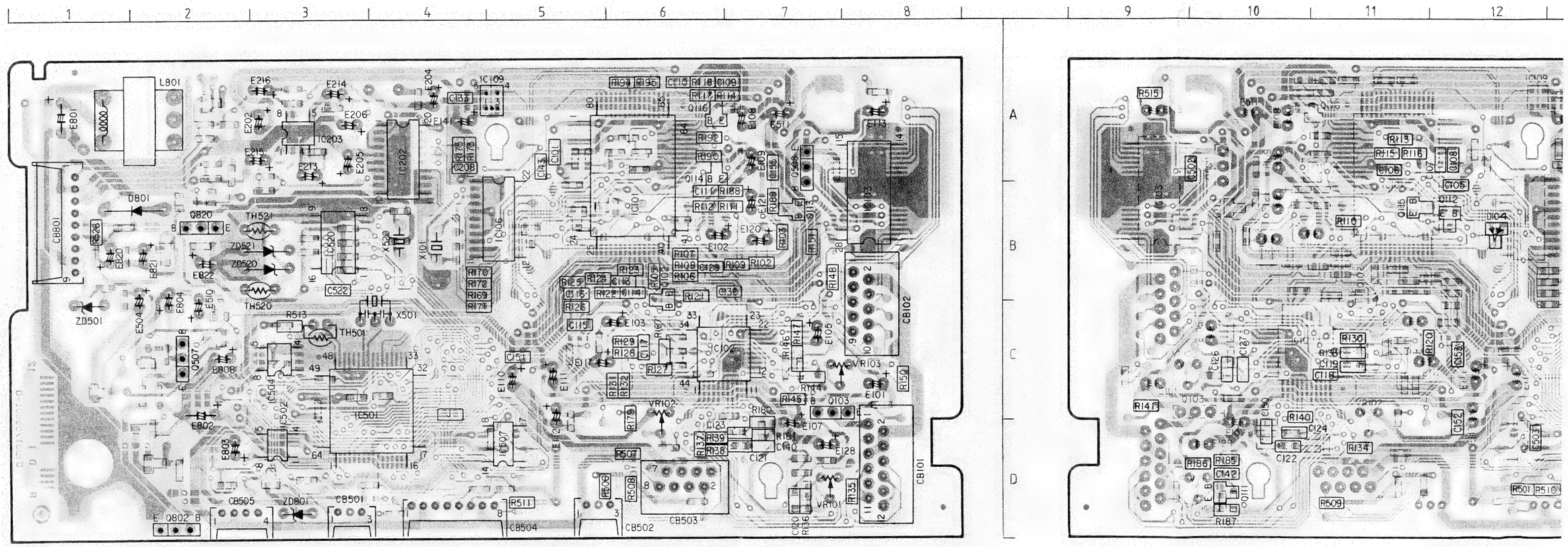
Mode: playback (test CD audio signals disc 1, track no.1 1 kHz
All resistor values are in Ohm; K = 1000
All capacitor values are in μF; P = 0.000001

CD Signal Line (Digital)
L-ch Signal Line
R-ch Signal Line
Focus Error Signal Line
Tracking Error Signal Line
Spindle Drive Signal Line
Sled Drive Signal Line

PCS 73 968

14. Layout main PCB

C101	A5	C111	B6	C121	D7	C142	D10	C211	A14	C520	B13	E101	C8	E108	A7	E112	C5	E128	D7	E205	A14	E216	A14	E801	A1	E820	B1	IC102	C7	IC202	A4	IC507	D5	Q103	C10	Q115	B11	Q507	C15	R103	B7	R113	A11	R123	B6	R131	C6	R140	C10	R169	B4	R18
C103	B13	C113	B6	C122	D10	C143	A5	C212	A14	C521	B13	E102	B6	E109	A10	E113	A9	E128	D10	E206	A14	E216	A3	E802	C2	E820	B2	IC102	C10	IC203	A3	IC507	D12	Q103	C7	Q116	A11	Q508	A10	R105	B6	R114	A7	R124	B5	R132	C6	R141	C9	R170	B4	R18
C104	B13	C114	B6	C123	C7	C150	D10	C213	A15	C522	B3	E102	B11	E109	A10	E113	A8	E141	A4	E206	A3	E216	A14	E802	C15	E820	B16	IC103	B8	IC203	A14	IC520	B14	Q105	C15	Q116	A6	Q508	A7	R106	B6	R115	A11	R125	B5	R133	C11	R145	C7	R171	C4	R18
C105	B12	C115	C5	C124	D11	C151	C5	C214	A15	C805	C15	E103	C6	E109	A7	E117	C12	E141	A13	E213	A3	E504	C15	E803	D2	E821	B2	IC103	B9	IC501	C4	IC520	B3	Q111	D10	Q211	B15	Q802	D2	R107	B6	R116	A11	R126	C5	R134	D11	R146	C7	R172	B4	R18
C106	A11	C116	B5	C126	C10	C152	D12	C215	A14	C820	B15	E103	C11	E110	C5	E117	C5	E202	A14	E213	A14	E510	C2	E803	D15	E821	B15	IC106	B12	IC501	C13	L801	A16	Q112	B12	Q212	A15	Q802	D15	R108	B6	R117	A6	R127	C6	R135	D8	R147	C7	R173	A4	R18
C107	A12	C117	C6	C127	C10	C153	C12	C501	C14	D104	B12	E105	C10	E110	C12	E120	B10	E202	A3	E214	A14	E510	C15	E804	C15	E822	B2	IC106	B5	IC502	D14	L801	A2	Q113	B7	Q401	D14	Q803	D15	R109	B7	R118	A6	R128	C6	R136	D7	R148	B7	R175	A4	R19
C108	A12	C118	C11	C130	B7	C155	A7	C502	A10	D801	B15	E107	D10	E111	C5	E120	B7	E204	A13	E214	A3	E511	A10	E804	B2	E822	B15	IC109	A12	IC502	D3	Q101	B15	Q113	B10	Q505	C15	Q804	D15	R110	B11	R120	C12	R129	B6	R137	D6	R150	C8	R179	C6	R19
C109	A7	C119	C11	C133	A4	C204	A13	C503	D12	D801	B2	E107	D7	E111	C12	E121	B7	E204	A4	E215	A14	E511	A7	E808	C15	IC101	A11	IC109	A5	IC504	C14	Q102	B11	Q114	A6	Q506	C16	Q820	B15	R111	B7	R121	B6	R129	C6	R138	D6	R151	B7	R180	D7	R19
C110	A6	C120	D7	C140	D7	C208	A4	C504	C14	E101	C9	E108	A10	E112	C12	E121	B10	E205	A3	E215	A3	E801	A16	E808	C2	IC101	B6	IC202	A13	IC504	C3	Q102	B6	Q114	A11	Q507	C2	R102	B7	R112	B6	R122	B6	R130	C11	R139	D6	R167	C6	R181	D7	R19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205	A14	E216	A14	E801	A1	E820	B1	IC102	C7	IC202	A4	IC507	D5	Q103	C10	Q115	B11	Q507	C15	R103	B7	R113	A11	R123	B6	R131	C6	R140	C10	R169	B4	R185	D10	R217	B14	R507	D6	R520	B14	R541	D13	TH501	C14	VR103	C8	ZD501	C1
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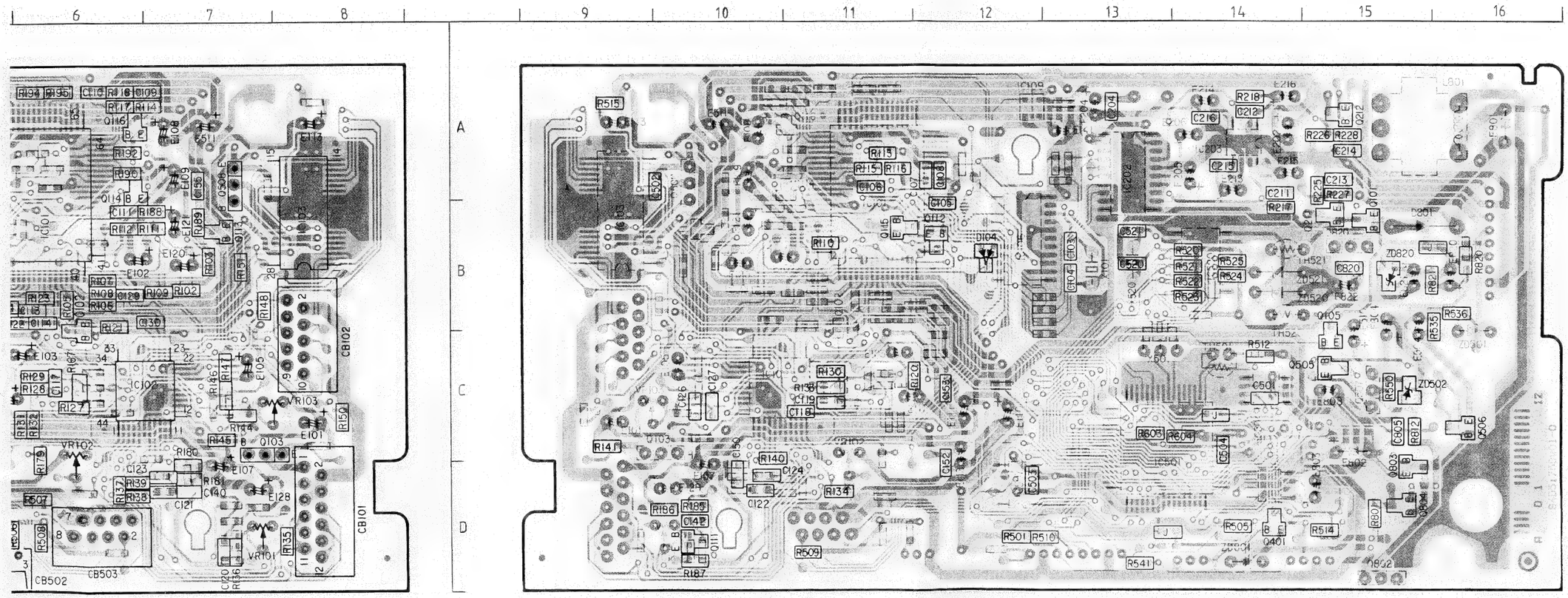
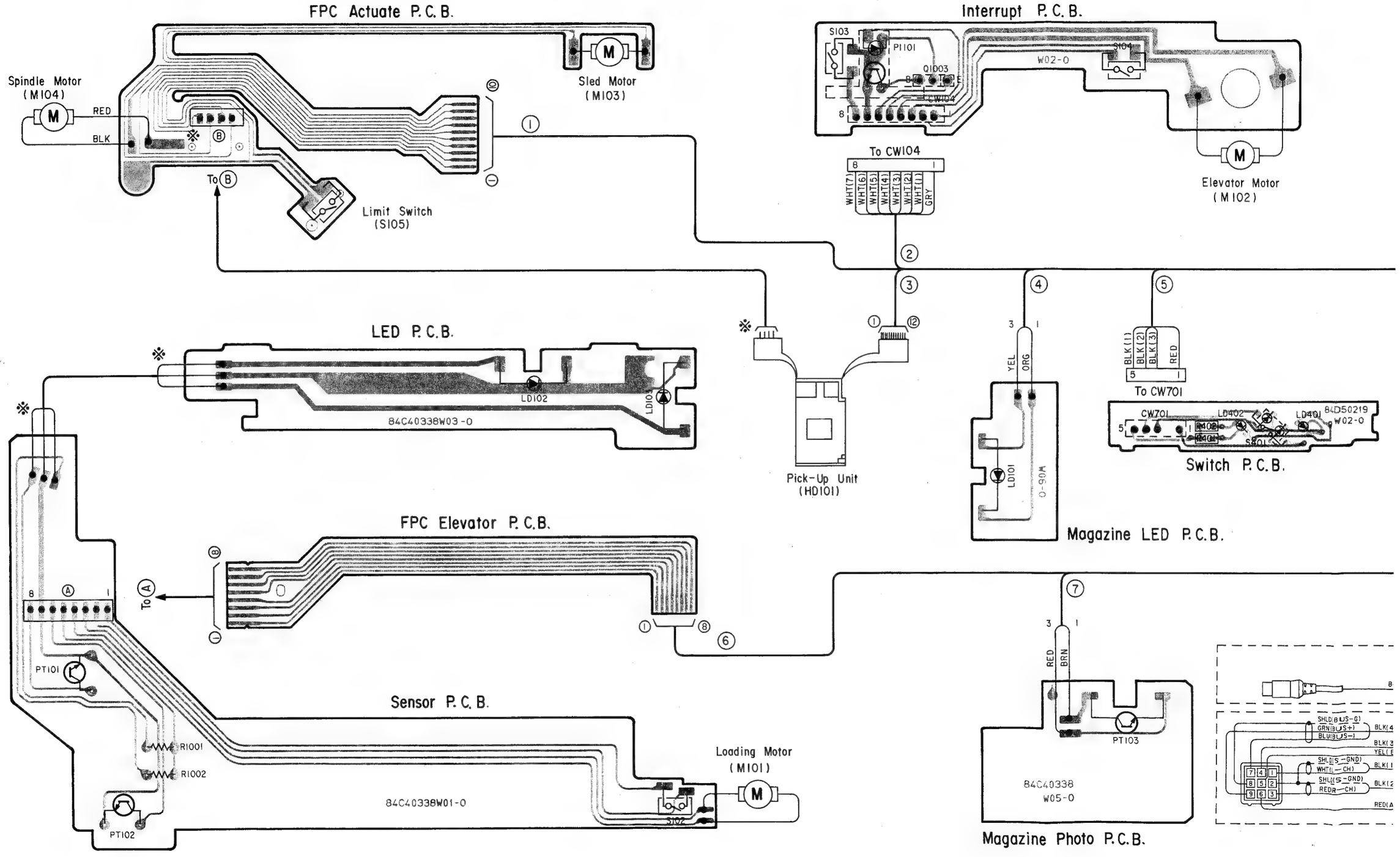
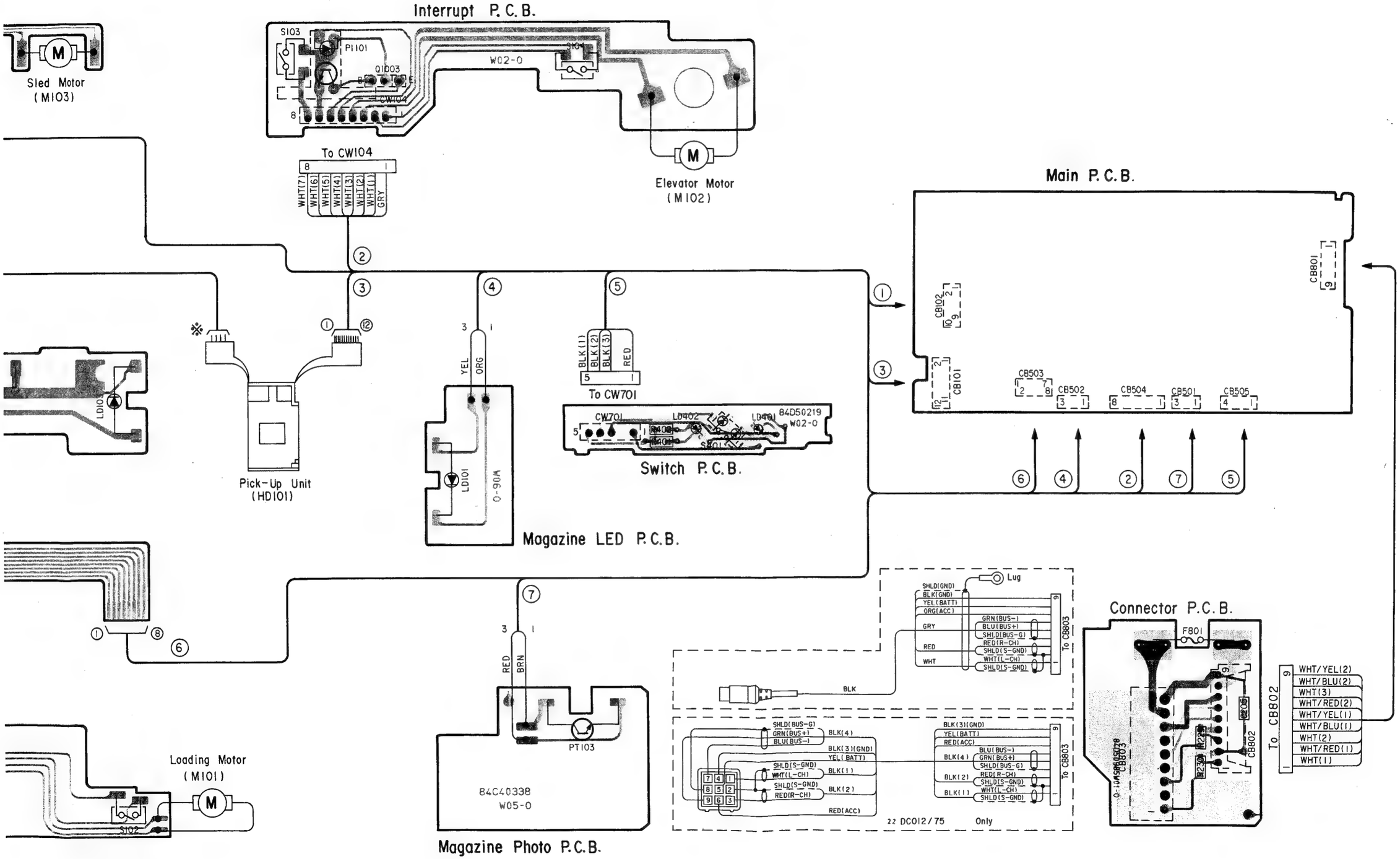
215	A3	E801	A16	E808	C2	IC101	B6	IC202	A13	IC504	C3	Q102	B6	Q114	A11	Q507	C2	R102	B7	R112	B6	R122	B6	R130	C11	R139	D6	R167	C6	R181	D7	R195	A6	R506	D6	R515	A9	R536	B16	TH501	C3	VR102	C11	ZD501	C16	ZD820	B15



16. Layout PCB's & wiring diagram

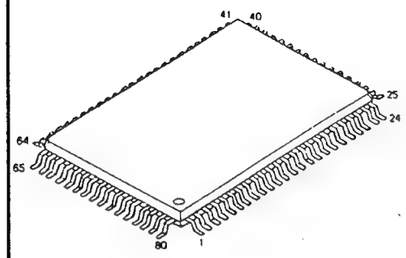


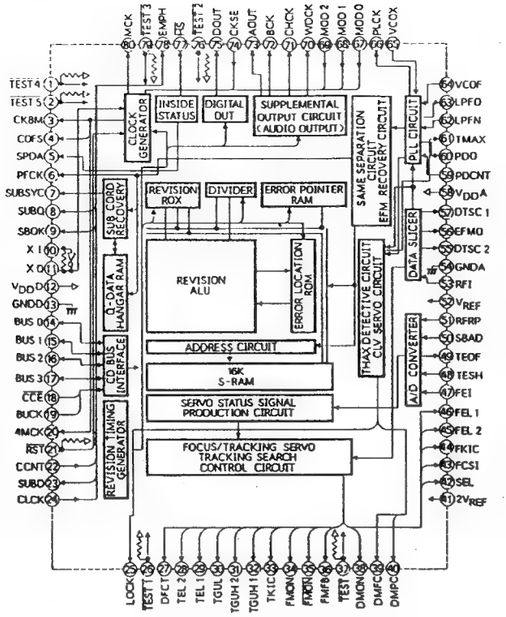

Interrupt P. C. B.
S103
P1101
Q1003
CW104
W02-0
S104
Sled Motor
(M103)
To CW104
WHT(7)
WHT(6)
WHT(5)
WHT(4)
WHT(3)
WHT(2)
WHT(1)
GRY
Elevator Motor
(M102)
Main P. C. B.
CB801
CB102
CB101
CB503
CB502
CB504
CB501
CB505
LD101
Pick-Up Unit
(HD101)
YEL
ORG
LD101
0-90M
BLK(1)
BLK(2)
BLK(3)
RED
To CW701
CW701
LD402
LD401
84D50219
W02-0
Switch P. C. B.
Magazine LED P. C. B.
Lug
SHLD(GND)
BLK(GND)
YEL(BATT)
ORG(ACC)
GRY
GRN(BUS-)
BLU(BUS+)
SHLD(BUS-G)
RED(R-CH)
RED
SHLD(S-GND)
WHT
WHT(L-CH)
SHLD(S-GND)
To CB803
BLK
Connector P. C. B.
F801
CB803
CB802
To CB802
WHT/YEL(2)
WHT/BLU(2)
WHT(3)
WHT/RED(2)
WHT/YEL(1)
WHT/BLU(1)
WHT(2)
WHT/RED(1)
WHT(1)
Loading Motor
(M101)
S102
PT103
RED
BRN
84C40338
W05-0
Magazine Photo P. C. B.
SHLD(BUS-G)
GRN(BUS+)
BLU(BUS-)
BLK(4)
BLK(3)(GND)
YEL(BATT)
SHLD(S-GND)
WHT(L-CH)
BLK(1)
SHLD(S-GND)
RED(R-CH)
BLK(2)
RED(ACC)
22 DC012/75 Only

PCS 73 970

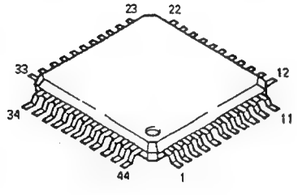
17. Semiconductor blockdiagrams & lead layout

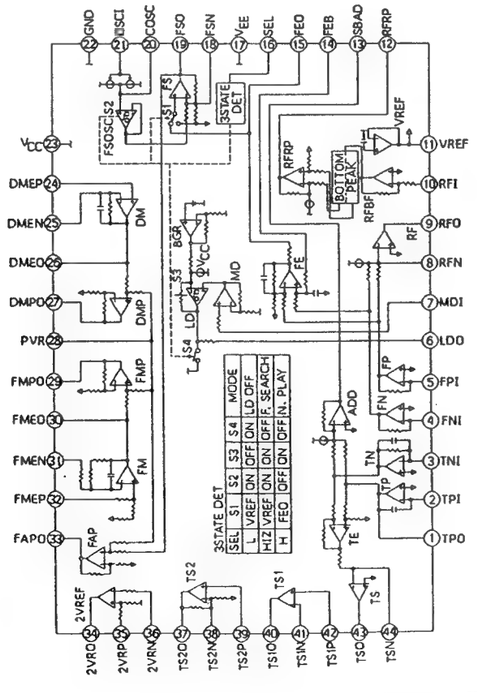
TC9236AF : IC101



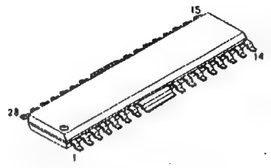


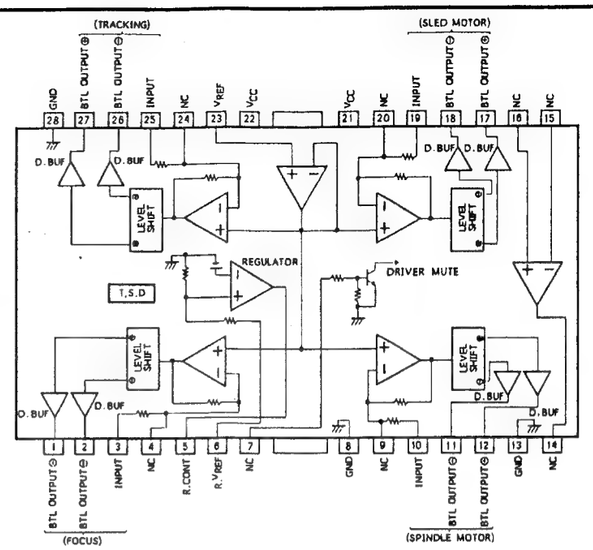
TA8191F : IC102



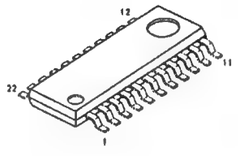


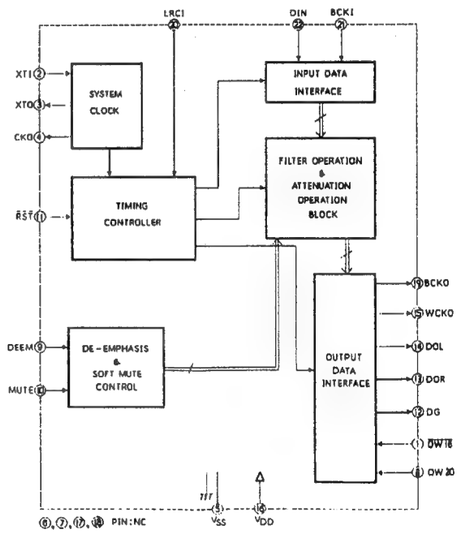
BA6298FP : IC103



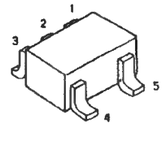


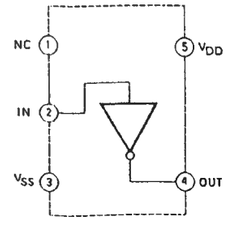
SM5840CS : IC106



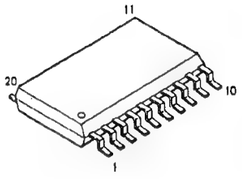


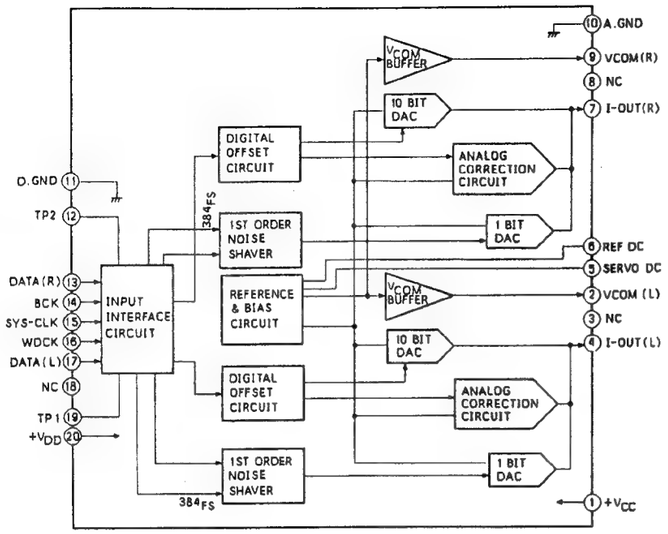
SC7SU04F : IC109



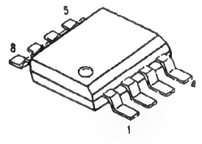


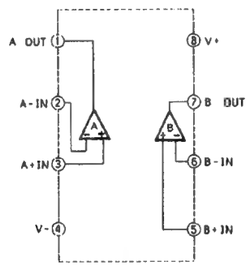
PCM67U : IC202



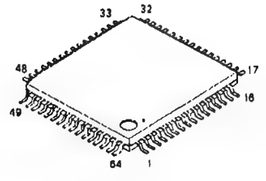


NJM4560M : IC203



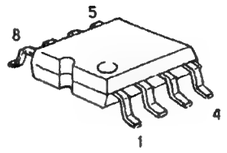


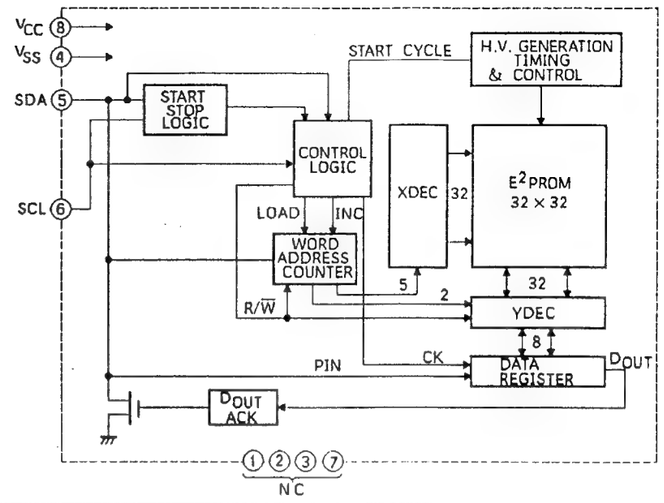
45552W22 : IC501



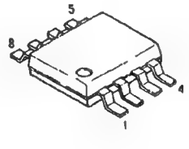
PIN NO.	CODE ADDRESS	I/O	PIN NO.	CODE ADDRESS	I/O	PIN NO.	CODE ADDRESS	I/O
1	SCL	I	23	$\overline{D-OUT}$	O	45	GND	-
2	SDA	I/O	24	GND	-	46	A . V_{SS}	-
3	NC	-	25	$\overline{LMT-SW}$	I	47	HI - TEMP	I
4	CS		26	LOCK	I	48	LO - TEMP	I
5	$\overline{RESET\ D2B}$		27	BUS 0	I/O	49	DISC - P	I
6	NC	-	28	BUS 1	I/O	50	LOAD - P	I
7	NC	-	29	BUS 2	I/O	51	DISC - OK	I
8	NC	-	30	BUS 3	I/O	52	DISC - NO	I
9	GND	-	31	BUCK	O	53	GND	-
10	NC	O	32	$\overline{CCE}$	O	54	GND	-
11	NC	-	33	NC	O	55	A . V_{DD}	-
12	A-MUTE	O	34	NC	-	56	A . V_{REF}	I
13	LOD M+	O	35	RESET	I	57	SO D2B	-
14	LOD M-	O	36	IRG	I	58	SI D2B	-
15	ELV M+	O	37	BATT	I	59	$\overline{SCK\ D2B}$	-
16	ELV M-	O	38	ACC	I	60	$R/\overline{W}$ D2B	-
17	V - CONT	O	39	$\overline{EJT-KEY}$	I	61	$C/\overline{D}$ D2B	-
18	F - CONT	O	40	V_{DD}	-	62	NC	-
19	$\overline{LS-RST}$	O	41	X2	-	63	NC	-
20	$\overline{LOAD-SW}$	I	42	X1	-	64	NC	-
21	$\overline{HOME}$	I	43	GND	-			
22	MAG - SW	I	44	NC	-			

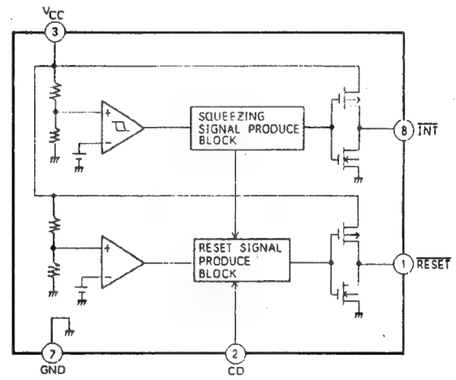
X24LCO1SI : IC502



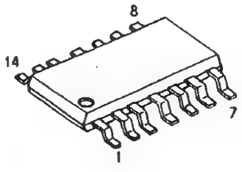


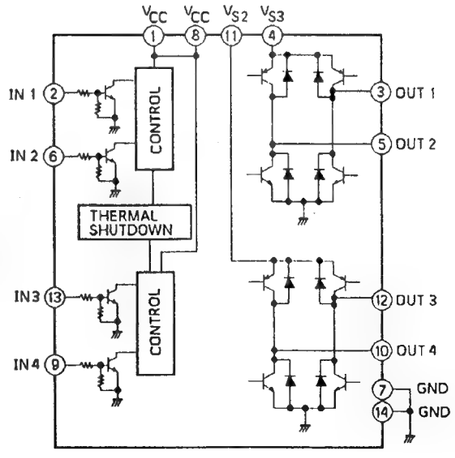
M62007FP : IC504





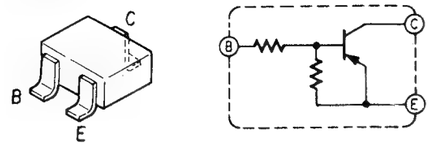
LB1836M : IC507



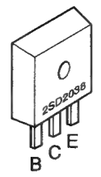


PCS 73 972

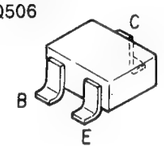
DTA124 : Q101 , 115 , 505 , 804
DTC114TK : Q112 , 113



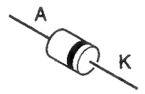
2SD2038 : Q801



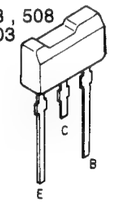
2SA1037K : Q102
2SC4081 : Q111
2SC2412K : Q506



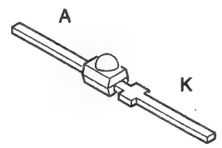
10E2 : D801
HZS6A3L : ZD501
MA2051 : ZD520 , 521
HZS9A2L : ZD801



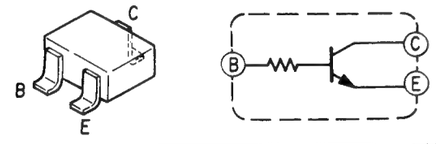
2SB1237 : Q103 , 508
2SA937 : Q1003



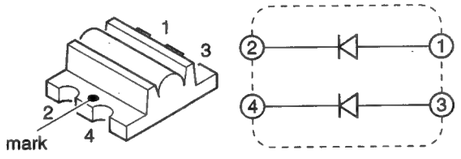
AN501 : LD101 , 102 , 103



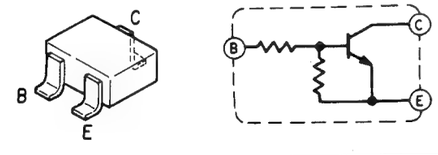
DTC124TK : Q105 , 114 , 116 , 803
DTC343T : Q211 , 212



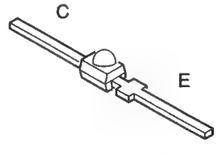
BG1202W : LD401 , 402



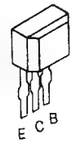
DTC114K : Q401



PS5022 : PT101 , 102 , 103



2SD1859 : Q507 , 820



18. List of electrical parts

All components are chip, unless stated otherwise (*) and el.cap.
For resistors and capacitors refer to Standard component catalogue 4822 736 53404.

TH501	4822 111 92105	Thermistor 100k (*)
TH520	4822 117 10762	Thermistor 8.2E (*)
TH521	4822 117 10762	Thermistor 8.2E (*)
VR101	4822 100 11879	Trim potm. 150k (*)
VR102	4822 100 12116	Trim potm. 15k (*)
VR103	4822 100 12115	Trim potm. 2.2k (*)

D104	4822 130 33944	DAN202K
D801	4822 130 31087	10E2 (*)
LD101	4822 130 82808	AN501 LED red (*)
LD102	4822 130 82808	AN501 LED red (*)
LD103	4822 130 82808	AN501 LED red (*)
LD401	4822 130 83486	BG1102W LED green (*)
LD402	4822 130 83486	BG1102W LED green (*)
ZD501	4822 130 83484	Zener HZS6A3L (*)
ZD502	4822 130 83499	Zener RD5.6MB2
ZD520	4822 130 83544	Zener MA2051 (*)
ZD521	4822 130 83544	Zener MA2051 (*)
ZD801	4822 130 83485	Zener HZS9A2L (*)
ZD820	4822 130 83499	Zener RD5.6MB2

Q101	4822 130 61495	DTA124
Q102	4822 130 62863	2SA1037K
Q103	4822 130 61439	2SB1237 (*)
Q105	4822 130 42821	DTC124K
Q111	4822 130 60669	2SC4081
Q112	4822 130 90323	DTC114TK
Q113	4822 130 90323	DTC114TK
Q114	4822 130 42821	DTC124K
Q115	4822 130 61495	DTA124
Q116	4822 130 42821	DTC124K
Q211	4822 130 62861	DTC343T
Q212	4822 130 62861	DTC343T
Q401	4822 130 63448	DTC114K
Q505	4822 130 61495	DTA124
Q506	4822 130 61272	2SC2412K
Q507	4822 130 63449	2SD1859 (*)
Q508	4822 130 61439	2SB1237 (*)
Q802	4822 130 63447	2SD2038 (*)
Q803	4822 130 42821	DTC124K
Q804	4822 130 61495	DTA124
Q820	4822 130 63449	2SD1859 (*)
Q1003	4822 130 63451	2SA937 (*)

IC101	4822 209 31764	TC9236AF DATA/servo process
IC102	4822 209 31765	TA8191F RF amp/Servo contr
IC103	4822 209 32759	BA6298FP Servo driver
IC106	4822 209 32752	SM5840CS Digital filter
IC109	4822 209 32755	SC7SU04F Inverter
IC202	4822 209 32754	PCM67U D/A converter
IC203	4822 209 83357	NJM4560M I/V converter
IC501	4822 209 32757	45552W22 µC
IC502	4822 209 32756	X24LC01SI EEPROM
IC504	4822 209 32753	M62007FP Reset
IC507	4822 209 32758	LB1836M Motor driver
IC520	4822 209 32751	µPD6316GS Bus driver

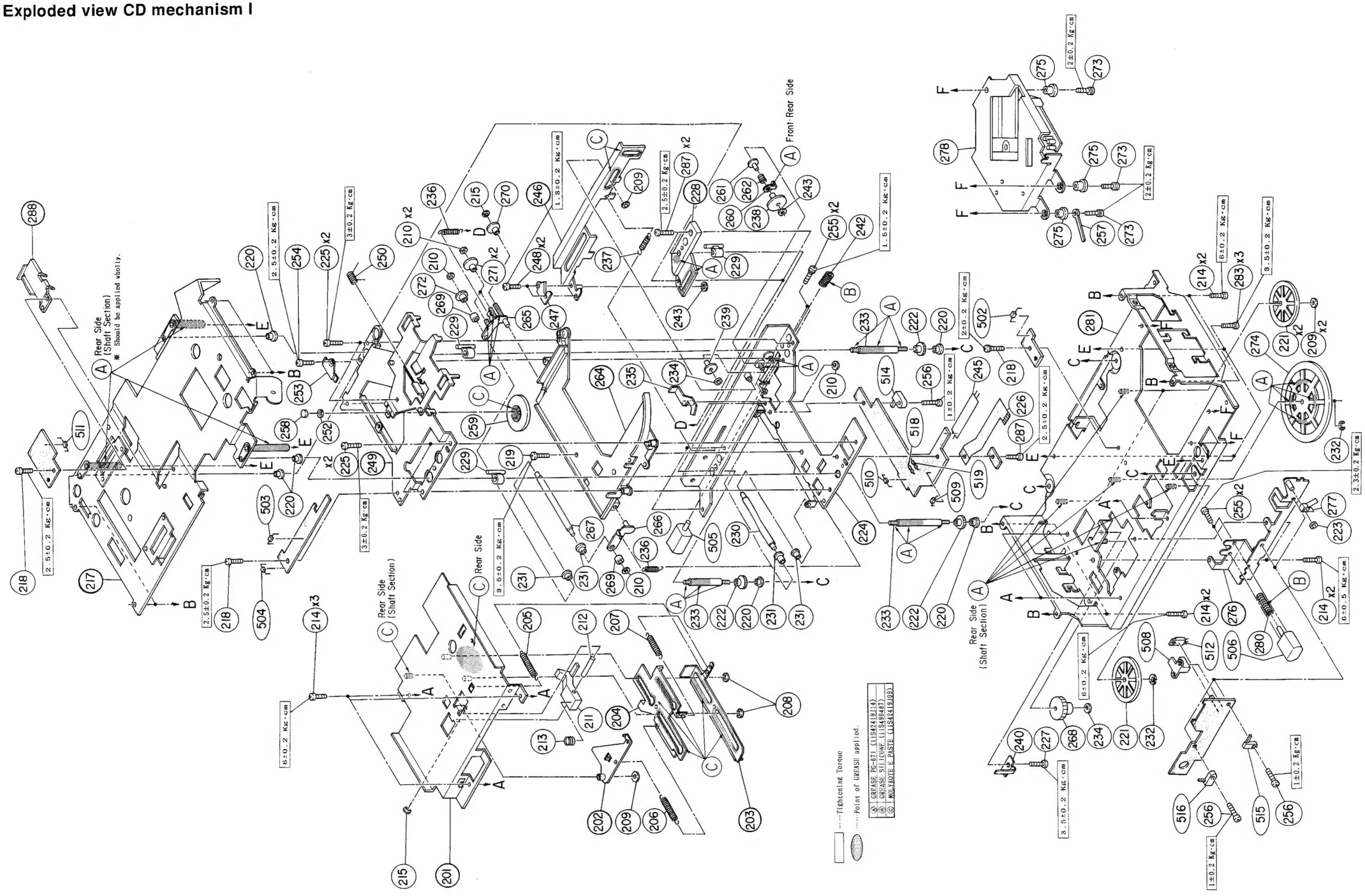
Switch

S102	4822 276 13167	Loading (*)
S103	4822 276 13167	Home (*)
S104	4822 276 13167	Magazine in (*)
S105	4822 276 13167	Limit (*)
S401	4822 271 30815	Eject (*)

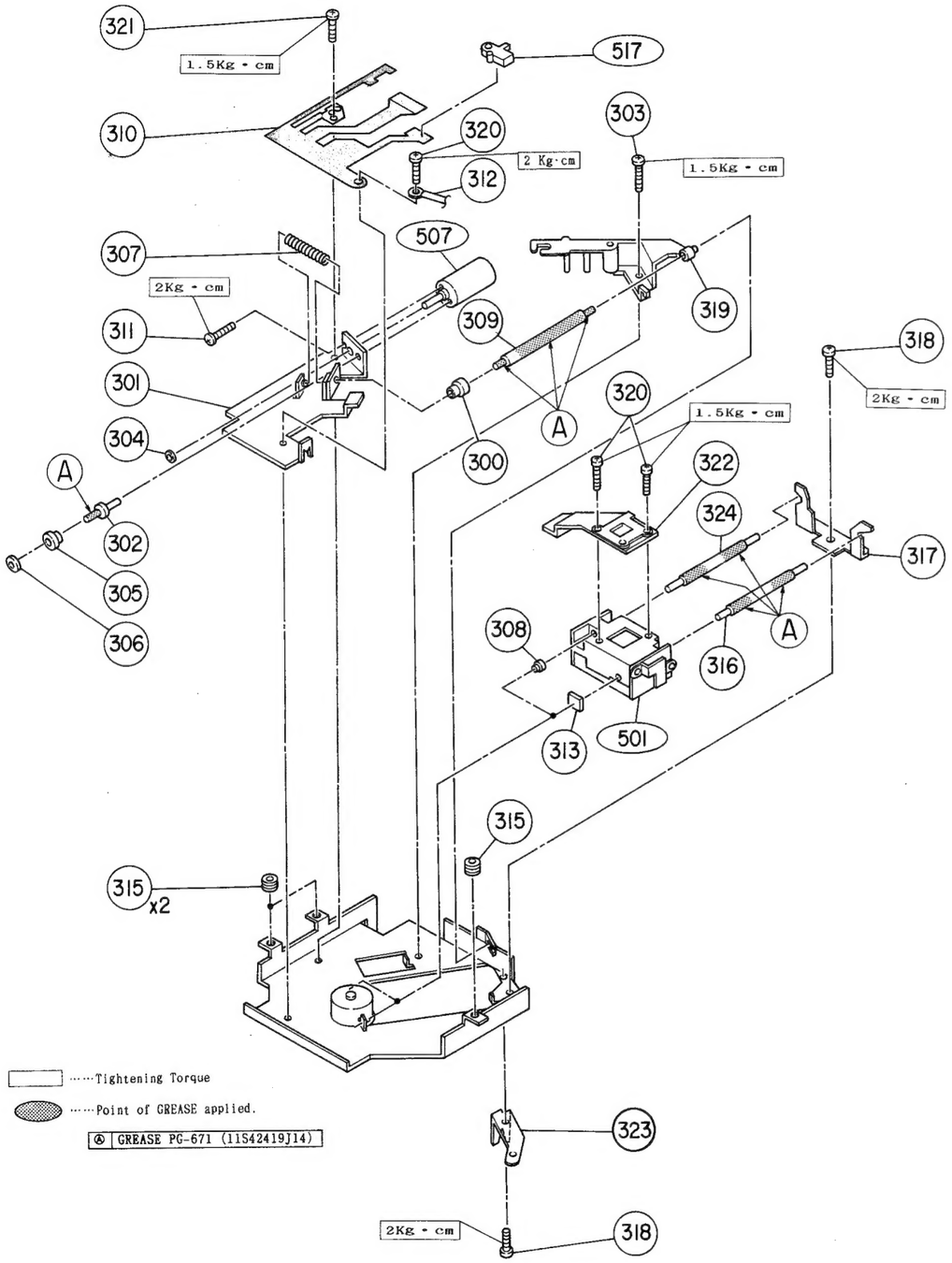
Miscellaneous

F801	4822 253 30445	Fuse 3A (*)
HD101	4822 214 52123	Pick-up unit (*)
L801	4822 157 70846	Choke (*)
M101	4822 361 30372	Loading motor (*)
M102	4822 361 30369	Elevator motor (*)
M103	4822 361 30371	Servo motor (*)
PI101	4822 130 82807	GP1S51 Photo interruptor
PT101	4822 130 63446	PS5022-B1 Photo trans. (*)
PT102	4822 130 63446	PS5022-B1 Photo trans. (*)
PT103	4822 130 63098	PS5022 Photo trans. (*)
X101	4822 242 81586	Crystal 16.9344MHz (*)
X501	4822 242 80405	Ceram. filter 4.19MHz (*)
X520	4822 242 81585	Crystal 12MHz (*)

19. Exploded view CD mechanism I



20. Exploded view mechanism II



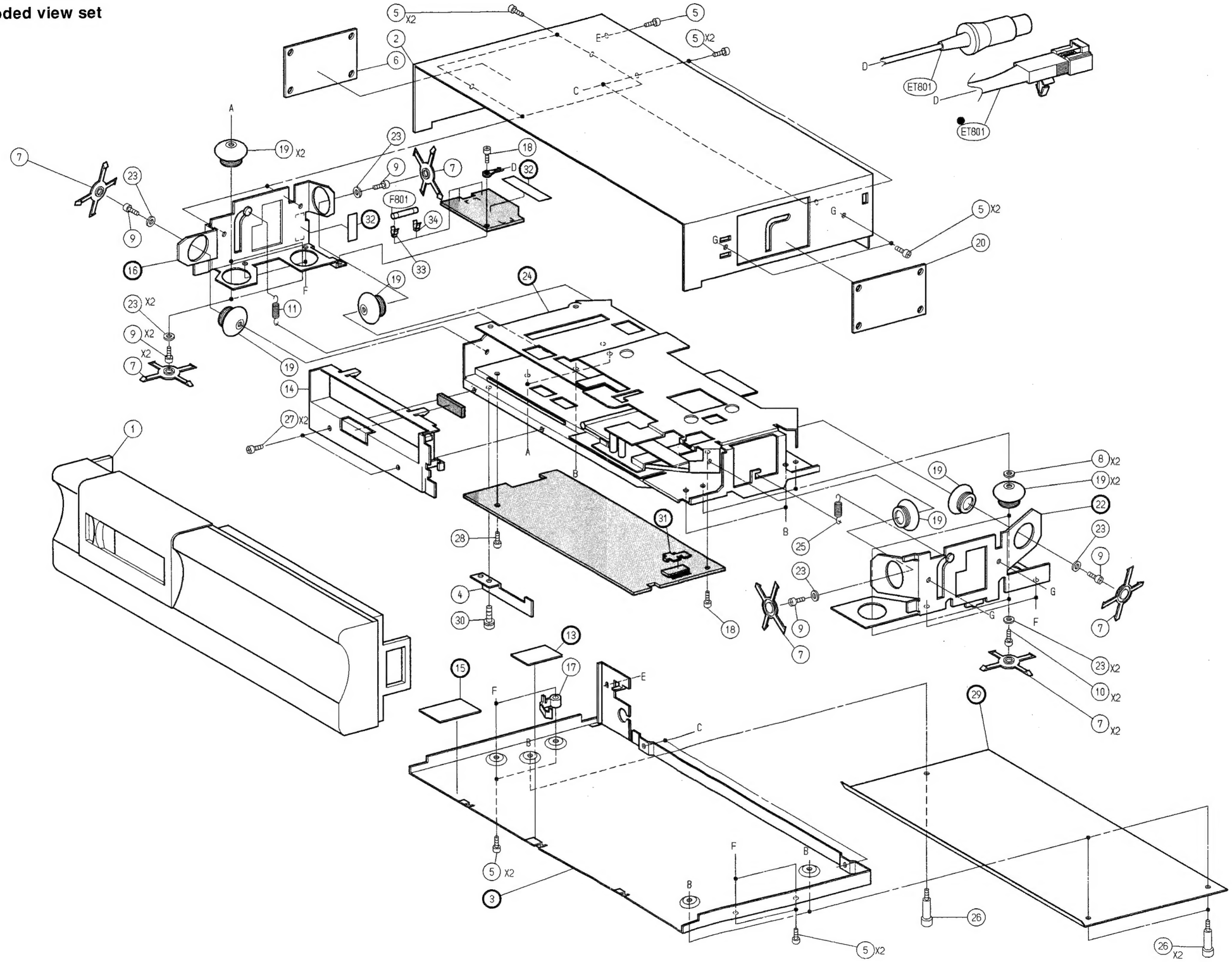
21. List of parts CD mechanism

Only parts listed below are considered Service parts.

203	4822 404 21317	Eject bracket
205	4822 492 33299	Extension spring
221	4822 522 33135	Idle gear
226	4822 466 10608	Foil pcb, elevator
230	4822 535 93438	Roller shaft, bottom
231	4822 532 21488	Bush on shaft 230, 267
234	4822 522 33126	Washer fix gears 239, 268
238	4822 522 33417	Large gear, rear right
239	4822 522 33133	Large gear, rear centre
242	4822 522 33131	Worm, rear centre
243	4822 530 70598	Lock washer, fix 228, 238
259	4822 466 82869	Clamper
261	4822 532 12265	Small bush, rear right
267	4822 528 70762	Roller shaft, left
268	4822 522 33414	Worm wheel, centre left
270	4822 522 33129	Gear, rear centre
271	4822 522 33415	Small gear, rear centre
272	4822 522 33416	Small gear, rear centre
274	4822 522 33132	Large gear, centre
278	4822 691 30323	Drive unit (incl. M104)
280	4822 522 33127	Worm on M102
300	4822 522 33421	Gear, on spindle 309
302	4822 535 80893	Spindle
304	4822 522 33418	Gear on M103
305	4822 522 33419	Gear on spindle 302
309	4822 535 93439	Threaded shaft
310	4822 466 10644	Foil pcb, actuate
315	4822 529 10299	Cushion
316	4822 535 93443	Shaft, Pick-up unit 50°
324	4822 535 93444	Shaft, Pick-up unit B

PCS 73 975

22. Exploded view set



23. List of mechanical parts set

Only parts listed below are considered Service parts.

1	4822 459 50797	/00/75
1	4822 459 50869	/35/60/60E/61
2	4822 423 41245	
6	4822 466 62421	
7	4822 256 92104	
8	4822 532 12261	
11	4822 492 71409	
14	4822 466 62423	
19	4822 529 10298	
20	4822 466 62422	
25	4822 492 71411	
26	4822 502 21393	/00/35/60/60E/61
26	4822 502 21398	/75
ET801	4822 267 51284	DIN 13p
ET801	4822 267 51285	/75 (9p)

Accessories (22DC012/00 only)

A	4822 321 62262	Extension cable 13p
B	4822 321 62263	Cable, level C - DIN 13p
	4822 736 21862	Direction for use
	4822 310 31989	Installation kit
	4822 691 10356	Magazine, 6 CD's